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Luxembourg Income Study Working Paper Series

Working Paper No. 518

**Poverty and Institutional Regimes:
A Generalised Budget Approach in 11 countries**

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Poverty and institutional regimes

A generalised budget approach in 11 countries

J.C. Vrooman*

Abstract

The standard poverty lines applied in empirical research tend to be problematic in terms of validity, reliability, ease of application or socio-political credibility. This paper introduces an international version of an alternative method, which originally has been developed for the Netherlands. The approach starts from a detailed expert reference budget for a single person, which is subsequently generalised to other household types and over time.

The empirical analyses try to assess whether Esping-Andersen's famous distinction between social-democratic, liberal and corporatist institutional regimes is related to actual differences in the 'production of poverty' in 11 countries, as measured by the generalised budget approach. Bivariate results from the Luxembourg Income Study indicate that liberal regimes (Australia, Canada, UK, USA) attain a substantially higher degree of poverty than representatives of the corporatist type (Belgium, Germany, France). Poverty in the latter group exceeds the level reached by exponents of the social-democratic regime (Denmark, Norway, Sweden) and the hybrid Dutch system.

Multi-level analysis, however, shows that much of these differences have to be attributed to the characteristics of individuals, and to the divergent level of prosperity of these countries. The 'pure' effects of the regime type on poverty all run in the direction that was expected on theoretical grounds, but are rather modest. Only the difference between the high poverty rates in the liberal group and the lower incidences in other countries turned out to be statistically significant.

Keywords: *poverty; poverty lines; budget method; social security; welfare regimes; institutions*

1. Introduction

The most commonly-used poverty lines encountered in the scientific literature have a number of serious drawbacks. The influential *relative income threshold*, typically set at 50% or 60% of equivalised median household income, of course has the plus-point that it is easy to calculate across a wide selection of empirical datasets. In addition, advocates of this criterion often see it as an advantage that there is an automatic correction for differences in prosperity between different countries; when measuring poverty through this indicator, some allowance is made for the fact that per capita GDP in the Scandinavian countries, for example, is higher than in the Mediterranean states.

However, from a principal point of view the relative income threshold seems invalid in two respects. Since it is the income differential relative to the average citizen that is decisive, poverty essentially is equated to an issue of distribution; in other words, it is "inequality in disguise" (Van Praag & Ferrer-i-Carbonell, 2004: 295)¹. This is demonstrated by the strong empirical link between relative poverty rates and income inequality indicators. For instance, in a sample of 150 observations in 38 countries during the period 1980-2003 – drawn from the Luxembourg Income Study (LIS) and the European Community Household Panel Survey (ECHP) – the correlation between poverty as measured by the 60% of median income-criterion and the Gini-coefficient is 0.89 (see appendix 1).

In addition, the relative income criterion completely ignores the extent to which people with an income at the threshold level are able to obtain what is minimally required in their society. To use Sen's (1980) terms, therefore, this criterion is by definition 'fetishistic': it does not specify the standard of living people are actually able to achieve with their resources. At a level of 60% of median income, they

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may be able to sustain a fairly good way of life in prosperous countries (e.g. Norway). On the other hand, in a communist society where incomes are virtually equalised around the median (e.g. North Korea) very few people will fall below the relative income threshold; but if even a median income is not enough to buy food, clothing, and adequate housing one would still be inclined to describe the situation as one of mass poverty.

The relative income threshold also gives rise to a number of practical objections. It does not necessarily comply with Sen's (1976) 'focus on the poor' axiom. He argued that the degree of observed poverty should depend solely on the resources of the poor themselves, and must not be influenced by the income and wealth development of the non-poor. However, if the relative threshold is derived from the median², the poverty rate will rise if there is a real increase in median incomes and lower incomes lag behind. This can lead to counter-intuitive findings, especially in times of major shifts in prosperity levels. If these increase sharply, as happened in Ireland in the 1990s, median incomes often rise more in real terms than the lower ones. Although the standard of living of those on lower incomes improves in this case, there will still be an increase in measured poverty³. A further reliability issue is the ceiling effect that may affect median-based relative poverty lines. If one uses median income as a point of reference, the level of relative poverty can by definition never rise above 50%, and in practice the ceiling often lies at around 30% (see appendix 1, and the discussion in Vrooman, 2009: 373-374). Poverty that occurs on a very large scale can thus not be reliably established using this criterion.

The social relevance of relative income thresholds may be limited as well; the outcomes can sometimes lack credibility for those concerned. The Irish example in the 1990s has already been mentioned, but the enlargement of the EU to accommodate 12 new member states in the period 2004-2007 is also illustrative in this respect. Some new member states in Central and Eastern Europe traditionally combine a flat income distribution with a low median income. As a result, the degree of relative poverty – the key criterion in the EU's 'Laeken indicators' for poverty and social exclusion – in the Czech Republic is comparable to that in Sweden and the Netherlands; Slovakia and Hungary end up close to Germany and France, while Lithuania has the same number of poor people as the United Kingdom. In some of the new member states, however, the material hardship which people report is much greater (Vrooman, 2008; EC, 2009), as would be expected given their lower per capita GDP⁴.

The criterion also seems rather problematic from a policy perspective. As long as the bottom incomes are distributed sufficiently uneven, through the relative threshold poverty will be detected. This gives policymakers a rather perverse incentive: in order to combat poverty it is always best to take measures which transfer income from the median citizen to the poorer classes. However, in countries with a comparatively low level of prosperity, it may be a more effective strategy to tackle poverty by maximising economic growth and accepting a somewhat greater income inequality, as long as the poor benefit sufficiently from the increasing prosperity.

An alternative would be to turn to objective-absolute poverty thresholds, which have a long tradition. The first studies of poverty from this perspective were carried out in England in around 1900, taking basic human needs as their starting point. These were generally limited to the purely physical necessities, such as food, clothing and shelter⁵ (Seebohm Rowntree, 1901; Booth, 1902 [1889]). In this tradition, households are regarded as poor if their income is insufficient to cover the minimal necessary expenditure for those needs. In the case of food, for example, the cheapest possible food basket is put together which provides the required number of calories. Theoretically, a broader definition of needs or necessities can also be applied (cf. Doyal & Gough, 1991). Gradations are therefore sometimes used with these kinds of poverty line; see e.g. Sarlo (2001). Modern empirical research is often based on detailed *expert budget standards*, which have been developed for many countries over the last decades (cf. Fisher, 2007). The British study edited by Bradshaw (1993) has been a particular source of inspiration here. In this approach, the researcher first draws up a detailed list of the goods and services he regards as the minimum necessary⁶. This list includes what different types of households need to eat and to heat the home, and what level of rent they have to pay for an acceptable home, but also includes things like how many winter coats and how much underwear people need, what constitutes an acceptable inventory for the home (furniture, carpets and curtains, linen, kitchen equipment), how often people have to wash clothing,

how many insurance premiums and local taxes people have to pay from their income, what they have to spend on memberships, subscriptions, transport and recreation, etc. A realistic price is then assigned to each of these items, and an estimate is made of the quantity a person needs in normal usage. If it is relevant, allowance is also made for the expected life of the item: if a winter coat normally lasts two years, half the purchase price is included each year. By adding up the annual monetary value of all items, standard budgets are constructed for different types of households. If the net disposable income is lower than this standard budget, the household is classed as poor. It makes no difference here whether households actually consume the different budget elements in this way: in the expert budget method, the measurement of poverty usually is means-based.

From a theoretical point of view, the expert budget standards method has the advantage of making explicit what the minimal communal necessities are; it is therefore not fetishistic. This also makes it possible to apply gradations to the poverty criterion, for example a subsistence level for the homeless, a basic minimum amount that is needed in order to run an independent household, or a threshold which makes possible social participation and recreation on a wide scale. Moreover, taking the available resources as a basis implies the focus is on the spending possibilities, rather than the actual consumption and possession of goods and services. This largely circumvents the issue of preferences, which is often difficult to resolve with consumption-based poverty lines. The social and policy relevance of these types of threshold will also be fairly high. They are in line with the notions on poverty among the public (cf. Saunders, 2004; Soede & Vrooman, 2008), and the detailed nature of the individual budget items lends them a high degree of credibility. A possible drawback is that the 'objective' method can be normatively tainted, as arbitrary perceptions and preferences of the experts involved may influence the number of poor people detected using this method. This can happen because the researchers are highly educated and have a relatively high income (so may take their own needs as an implicit criterion), because of the researchers' possible ideological bias (wanting to help the poor or to fight injustice), or because of the researchers' own interests (scientific status, wanting to secure research funding). In practice, however, the detailed nature and transparency of the method may constrain this discretionary scope; and the influence of researcher bias can be kept within bounds even further by having expert budgets tested by the public, via surveys or by the development of consensual budget standards (Bradshaw et al., 2008; Hoff et al., 2009).

However, this method also generates major problems in terms of applicability. Since the available goods and services, prices and spending patterns are constantly changing, the budget standards are never finished. This implies that the poverty line is continually moving, in a sometimes erratic way, which may complicate the analysis of time series; in addition, keeping the standards up to date requires a good deal of work. As a result of their labour-intensive nature, detailed budget standards are generally drawn up for only a limited number of household types, with little differentiation by age, income group, health impairments, region and ethnic origin. If a reference budget is not available for every household, it becomes difficult to establish generic poverty thresholds. Application of the method in international comparisons is even more complicated. Not all countries have developed detailed budget standards, and where they are available, methodological differences often imply that they cannot be used directly for comparative analyses.

Other criteria, such as *subjective poverty measures* (cf. Van den Bosch, 2002), suffer from similar drawbacks in terms of validity, reliability, applicability or socio-political credibility. Vrooman (2009: 366-383) provides a detailed overview and assessment, which is based on a typology of operational poverty thresholds. It would therefore be worthwhile to develop a new poverty line which retains the advantages of the expert budget method noted above, but which is easier to apply. The 'generalised budget approach' developed by The Netherlands Institute for Social Research | SCP for the Dutch case (Vrooman & Snel, 1999; Soede, 2006; Soede & Vrooman, 2008) may serve as a starting point here. The next section provides a general outline of this instrument, and the empirical results obtained when applying it over a longer period of time in the Netherlands. §3 discusses a number of hypotheses on the theoretical relationship between the institutional regime types prevailing in different countries and their 'poverty production'. These are subsequently tested for eleven countries (§4), using data from the Luxembourg Income Study in around the year 2000. §5 summarises the main conclusions.

2. The generalised budget approach to poverty in the Netherlands

In the generalised budget approach, two detailed minimum budgets are first determined for a single reference household in a given starting year. Using an empirical equivalence scale, this is then generalised to an initial poverty line for all household types. A historical series of threshold amounts is subsequently obtained by applying a dedicated index to the initial norms.

2.1 Reference budgets for a single person

The initial level of the poverty line was determined by The Netherlands Institute for Social Research | SCP on the basis of the budgets drawn up by the Dutch National Institute for Budgetary Information (Nibud). Each year, Nibud publishes highly detailed budgets for a number of household types, in which minimum norm amounts are set for all kinds of expenditure items. These norms are based on the opinions of experts (e.g. on the required quantity and quality of food), the availability of goods and services, and actual consumption patterns at the bottom end of the income distribution. The method used by Nibud rests on years of experience and detailed knowledge of the actual expenses faced by households. The Nibud budgets are also used by municipal social services, lenders, debt support organisations, etc.

Based on the detailed budgetary data provided by Nibud, two reference budgets were compiled for a Dutch person living alone⁷ (table 1). The first variant, the *basic needs* criterion, was based on the expenses that can be regarded as the minimum necessary in the Netherlands. These include costs that are difficult to avoid for things such as food, clothing, housing (including rent, insurance, energy, water, telephone, furnishings, home maintenance and local taxes) and a number of other expenses (transport, extra medical expenses, personal care, washing detergents, etc.). For food, the diets published by The Netherlands Nutrition Centre (*Voedingscentrum*) were used; for clothing purchases, the minimum norm was drawn from the 'NtexB study' of clothing purchases. The calculation of housing costs was based on the minimum costs for a rented two-bedroom flat. It was assumed that a household is privately insured for medical expenses through a shared contract (e.g. through one's employer), and that the premium has been deducted from disposable income. As a result, only out-of-pocket medical expenses not covered by the insurance were included in the budget. Fire and theft insurance and funeral insurance were deemed to be necessary, and the contributions due have therefore also been incorporated. The amount for transport costs is based on one national multi-journey bus and tram ticket (*strippenkaart*) per month, plus the maintenance and depreciation costs of a bicycle.

The total threshold amount obtained on the basis of these norms covers a minimal, but complete package of expenditure items. As long as no exceptional costs occur which are not reimbursed by the government or insurance companies, the budget is in principle sufficient to run an independent household without incurring debts or becoming dependent on charity (e.g. church social welfare, Food Banks). In order to attain this standard of living, a single person in 2000 needed a total of EUR 667 per month, as table 1 shows. If their disposable income is lower than this, they will very probably have too little money in the Dutch context to make ends meet. They can accordingly be described as poor.

The basic needs criterion includes the most necessary expenditure items, but no extras, such as the costs of social participation. The second variant does allow some scope for this. Modest amounts have been earmarked for recreation, membership of a library, sports or hobby club, subscription to a newspaper and magazine, and a pet. The selected items correspond almost exactly with one of the 'residual packages' used in the model minimum budgets drawn up by Nibud (2006: 50). This *modest but adequate* reference budget includes expenses which strictly speaking exceed that which is unavoidable, but there is no question of luxury, such as a car or foreign holidays. For a single person, the total amount needed to maintain such a lifestyle in 2000 was EUR 758 per month.

2.2 Initial poverty lines

The initial poverty lines were subsequently determined by applying equivalence factors to non-single households; these indicate how much more on average, say, a couple with two children of a certain age spend than a single person. The additional expenditure items include extra food and housing costs, but also non-reimbursed school and study fees for children living at home, etc. The equivalence scale for

various household types was established empirically by Statistics Netherlands (CBS) by applying the 'budget distribution method' to data from the Dutch Household Budget Survey. With this method, it is first determined what proportion of each expenditure item can be attributed to the individual family members. The additional costs of extra adults and children are then determined using regression analysis; and from this for each type of household ratios to a single person are derived which represent comparable levels of welfare (Siermann et al., 2004). Table 1 shows the norm amounts thus obtained for a number of characteristic household types. It also includes the amounts resulting from an alternative equivalence scale; this is somewhat steeper and will be discussed below.

Table 1 Reference budgets and poverty lines by family type (monthly amounts in euros, 2000)

| | Single | Single parent | | | Couple | Couple with children | | | |
|---|------------|---------------|------|------|--------|----------------------|------|------|------|
| Number of adults | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| Number of children | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 4 |
| Budget items | | | | | | | | | |
| Food and non-alcoholic beverages | 142 | | | | | | | | |
| Clothing, shoes | 32 | | | | | | | | |
| Rent | 216 | | | | | | | | |
| Gas/fuel | 30 | | | | | | | | |
| Electricity | 22 | | | | | | | | |
| Water | 7 | | | | | | | | |
| Local taxes | 24 | | | | | | | | |
| Telephone | 21 | | | | | | | | |
| Various insurances (excluding health care) | 23 | | | | | | | | |
| Furniture, maintenance house | 69 | | | | | | | | |
| Transport | 9 | | | | | | | | |
| Uncovered medical expenses | 11 | | | | | | | | |
| Other | 61 | | | | | | | | |
| Total = basic needs reference budget | 667 | | | | | | | | |
| Recreation | 37 | | | | | | | | |
| Public library | 2 | | | | | | | | |
| Newspaper and magazine | 23 | | | | | | | | |
| Sport/hobby club | 9 | | | | | | | | |
| Pet | 20 | | | | | | | | |
| Total = modest but adequate reference budget | 758 | | | | | | | | |
| Basic needs poverty line | | | | | | | | | |
| - with Dutch equivalence scale (Statistics Netherlands) | 667 | 888 | 1008 | 1175 | 914 | 1115 | 1255 | 1375 | 1522 |
| - with alternative equivalence scale ^a | 667 | 934 | 1157 | 1354 | 1012 | 1225 | 1415 | 1590 | 1753 |
| Modest but adequate poverty line | | | | | | | | | |
| - with Dutch equivalence scale (Statistics Netherlands) | 758 | 1007 | 1144 | 1333 | 1038 | 1265 | 1424 | 1560 | 1727 |
| - with alternative equivalence scale ^a | 758 | 1060 | 1313 | 1536 | 1148 | 1390 | 1606 | 1805 | 1990 |

^a Cf. §3

Sources: Soede (2006); Soede & Vrooman (2008)

2.3 The indexation method

For comparisons over time, it would be possible to use the updated norm amounts published by Nibud on an annual basis. However, this method can lead to complications if the expert judgment on what is minimally necessary changes markedly over the years, and if the norm amounts consequently have to be adapted. For example, if Nibud in a given year includes a mobile telephone or Internet connection in the minimum household budget, making the basic basket of goods and services more expensive in real terms, this may have saltatorial effects on measured poverty. In order to avoid this, it is preferable to determine the year-on-year evolution of the threshold amounts using a theoretically substantiated indexation of the initial levels. The precise content of the basket of goods and services can then be reviewed at greater time intervals (for example every five or ten years).

In order to be able to map out the development of poverty in the Netherlands over time, the norm amounts from 2000 were indexed using a method recommended by the National Academy of Sciences (NAS) in a report to the US government (Citro & Michael, 1995). The Academy suggested that the poverty line be linked to changes in median expenditure on the basic items food and drink (excluding alcohol),

clothing and housing. It was anticipated that this would cause the threshold amounts to rise faster than inflation, but more slowly than a completely relative threshold; the indexation was supposed to be 'quasi-relative'. This is because, with rising incomes and unchanged preferences, people generally spend a declining share of their income on food, clothing and housing. The threshold thus reflects growing prosperity, though not completely.

In line with the NAS recommendations, the indexation was based on the three-year moving average in median expenditure on the basic items. The mutation in the index for 2000 thus reflects the development of real median expenditure in the period 1998-2000. One advantage of this is that the threshold amounts are less sensitive to sample fluctuations and the economic cycle. In addition, the poverty line adapts with a certain time lag to changes in actual spending patterns – just as the social perception of the minimum necessary generally typically reacts with some delay to socioeconomic developments. The index was calculated on the basis of the median expenditure on housing, clothing and food (excluding alcohol) from the Dutch Household Budget Survey. In the period 1990-2000, that expenditure rose by 10% in constant prices, exactly equal to the real increase in the model minimum budgets published by Nibud for those years (cf. Soede, 2006: 53). The changes experts perceive in the budget standard are thus well replicated via the indexation mechanism.

This combination of:

- meaningful initial levels for the reference household in an initial year,
- the derivation of the norm amounts for other household types via equivalence factors,
- and a quasi-relative, delayed indexation based on actual expenditure trends on the basic items

can be considered as a 'generalised budget approach'. This retains the conceptual advantages of the expert budget method. The poverty line is not fetishistic and reflects the absolute character of poverty; the current necessities have been specified in the reference budget, and whether or not people are poor does not depend directly on the circumstances of others. As with poverty lines based on the expert budget method, it focuses on people's consumption possibilities rather than their actual consumption. For these reasons, this method can be regarded as a valid operational translation of the theoretical poverty concept (cf. Vrooman, 2009: 360-362).

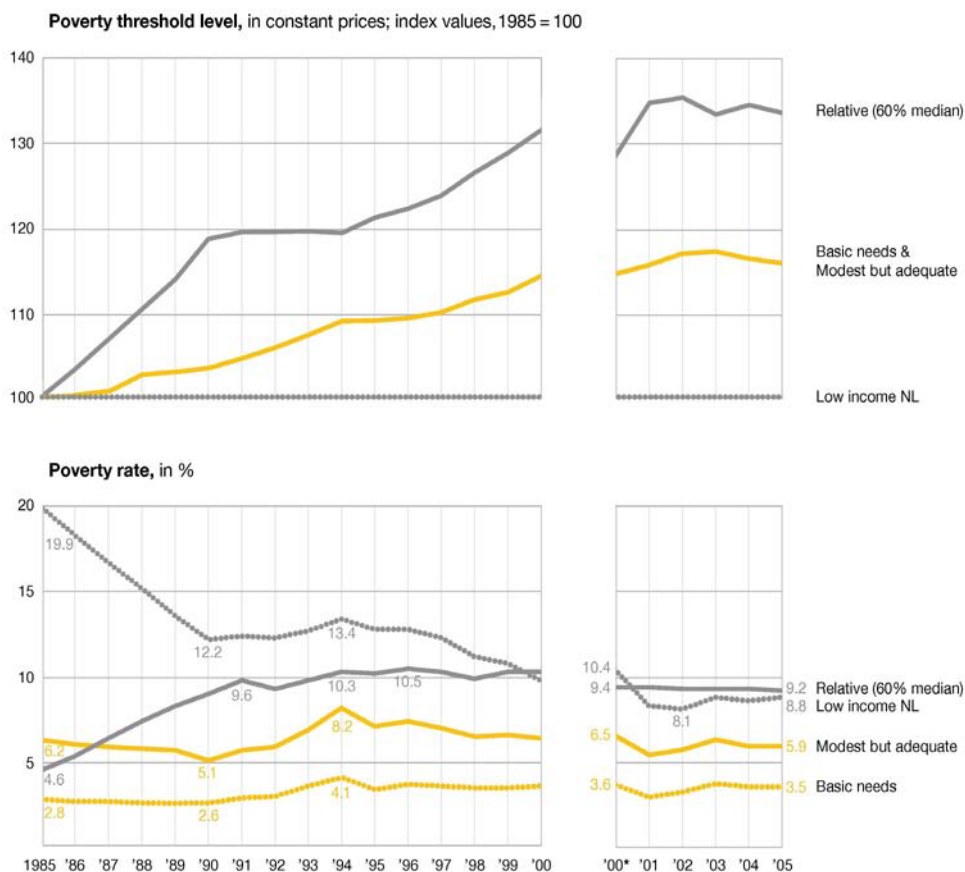
However, this method is much less labour-intensive than the traditional expert budget method, and can therefore be applied more easily in the practice of research. The norms are fairly simple to calculate for each year and each household type. The threshold amounts do not depend on the verbal qualifications assigned to income by respondents in a survey, so that the method does not suffer from the reliability problems of the subjective poverty lines. The threshold is probably also normatively credible and transparent for policymakers and the general public. The two variants appear to fit in well with poverty notions among the Dutch population (Soede & Vrooman, 2008; Hoff et al., 2009). The 'basic needs' variant can be seen as a minimum level, below which most Dutch people would regard the living standard being too low. The 'modest but adequate' variant turns out slightly higher, and contains items which many people consider indispensable or very desirable. Together, the two criteria probably provide a plausible bandwidth for the degree to which the theoretical notion of poverty applies to the actual living conditions of the population.

2.4 Outcomes of the generalised budget approach in the Netherlands

Figure 1 provides some insight into the results obtained using this method. It shows the trend in the norm amounts and poverty rates over the period 1985-2005. The degree of poverty has been assessed via the Dutch Income Panel Study (IPO), a large database (approx. 245,000 individuals in 85,000 households) built from administrative data held by the Dutch tax authorities, the population register and various benefits agencies. For comparison, the trends based on the relative 60%-median criterion and the Dutch low-income threshold (cf. Vrooman & Hoff, 2004) are also shown. The latter is based on the minimum social assistance level for a single person in 1979, adjusted for price inflation; norm amounts for the other households have been derived by applying CBS equivalence factors.

Because all poverty lines in the graph are in constant prices, and the low-income threshold is indexed to price inflation, the norm amount for this criterion remains constant and appears as a horizontal line. Median income in the Netherlands rose between 1985 and 2005 by roughly a third in real terms, and the relative income threshold level therefore shows the same increase. The norm for the two variants of the generalised budget approach rises in line with collective prosperity, but does not fully keep pace. Over the period as a whole, this amount rises by around a sixth (+17%) in real terms; a quasi-relative development, as expected.

Figure 1 Poverty lines and poverty rates in the Netherlands (1985-2005)^a



a. Poverty lines in constant prices; poverty rates based on equivalised disposable household income of persons

* In 2000 the Income Panel Study was revised, leading to a fall in median disposable income.

Sources: Dutch Income Panel Study, Dutch Household Budget Survey (Statistics Netherlands); Soede & Vrooman (2008); adapted

According to the low-income threshold, the poverty rates trend downwards over the period; in 1985, one in five people were poor, while by 2005 this has reduced to 9%. This is mainly because his threshold is indexed only to price inflation, whereas the level of prosperity rose more strongly in the period concerned. Measured against the relative poverty line, the poverty incidence rises sharply in the period 1985 of 1990, from just over 4% to 9%. It then remains rather stable at 10%, with minor fluctuations. This is in line with the evolution of income inequality in the same period: the Gini coefficient rose in the Netherlands between 1985 and 1991, after which it remained fairly constant (Pommer et al., 2003: 48; Vrooman et al., 2007: 129).

The poverty rate measured using the 'basic needs' and the 'modest but adequate' variant is lower in virtually all years than that measured using the other two poverty lines. In 1985 the gap compared with low incomes is very wide (14-17 percentage points), but this difference reduces steadily over time. Since the poverty line partially follows the development of national prosperity, the poverty rate does not show a structurally downward trend. Apart from this, the mutations often move in the same direction as with the low-income threshold, with peaks around the economically weak years 1994 and 2003/2004. The in-

cidences according to the relative poverty line, on the other hand, are not sensitive to the fluctuations in the economic cycle.

Evidently, the poverty rates generated by the basic needs criterion are consistently lower than according to the modest but adequate variant. The trends are broadly similar, with the exception of the period 1995-2000, when the poverty rate based on the basic needs criterion was virtually stable, while according to the modest but adequate variant it fell. This suggests that those on the very lowest incomes benefited less during that period from the economic upturn than those with a slightly higher income. In addition, it turns out that the composition of the poor population can be readily interpreted in all years, though it is striking that the weight of the working poor in the total increases over time (cf. Soede, 2006; Vrooman et al., 2007).

All in all, the generalised budget approach seems to offer a plausible picture of the actual evolution of poverty in the Netherlands. Through this method, a good insight is obtained into the size and composition of the group whose income is almost certainly inadequate according to current Dutch standards. The trend found is more plausible than the structurally falling poverty rates based on the low-income threshold, or the very even picture suggested by the relative approach. The levels are low, but this is not unexpected in a fairly prosperous country with a rather equal income distribution. It is however not the case that this method defines the poverty problem out of existence: according to the lowest variant, the basic needs criterion, 560,000 people were qualified as poor in 2005; that is one in 25 Dutch citizens, and more than 30 times as high as the client base of the Dutch food banks (approx. 8,000 households in February 2006). Based on the higher 'modest but adequate' variant, still one in 16 inhabitants of the Netherlands qualified as poor.

In the remaining part of this paper, these two thresholds will be used to test a number of hypotheses concerning the impact of institutional regime types on poverty rates. In principle, the method can also be applied in other countries and in international comparative research. The royal road would be to determine the initial threshold amounts for the reference household in other countries, too, in accordance with the Nibud methodology; and then to apply suitable national equivalence scales and a similar country-specific indexation mechanism to these. A simple approximation of this can be obtained by translating the Dutch norm amounts to other countries using purchasing power parities, and by applying the same equivalence scale in all countries. For country comparisons over time, the indexation perhaps could be based on expenditure data from the National Accounts. A single-year example of such an approach will be given later in this paper. First, however, it is important to specify the research questions for this empirical cross-comparative analysis.

3. Regime types and poverty

Esping-Andersen's (1990, 1999) famous distinction between social-democratic, liberal and corporatist "welfare regimes" theoretically implies different ways to combat poverty⁸. In the first regime type the emphasis is on de-commodification: ensuring that people attain a certain standard of living, irrespective of their market value. According to the social-democratic approach, the best way of tackling poverty is to give all residents an entitlement to a guaranteed minimum living standard, regardless of their present or former position on the labour market. In order to finance this, it is desirable that as many people as possible should be in paid employment: this increases the tax proceeds and the revenue from social insurance contributions, and reduces the costs of benefit dependency.

The liberal strategy is based on the idea of individual responsibility within a market setting. People are expected as far as possible to generate their own present income and their desired future income security (e.g. on retirement) via private arrangements. There is only a limited collective safety net, in the form of a sparse social assistance scheme which is subject to strict conditions and may be limited in duration. Since the government extracts less money from private households and businesses, more remains for consumption and investments. This is supposed to increase the national wealth and jobs

growth; and such collective gains will ultimately trickle down to people at the bottom of the income distribution, thus reducing the level of poverty.

The corporatist regime type emphasises the income continuity of the traditional wage earner. Provided people have an adequate employment history, their loss of income in the event of unemployment, retirement or sickness is limited. When these eventualities occur, these insiders can claim high wage-related social insurance benefits. The poverty risk mainly affects outsiders: people who are not or insufficiently covered by the elaborate social insurance schemes. This concerns especially those who have never held a job, who perform low-paid work or who have a short or interrupted employment career (and their dependent relatives). As long as the number of outsiders remains limited, the strategy of the corporatist regime can theoretically also offer a successful means of combating poverty.

Based on these model strategies it is not possible to say in advance which regime type will in theory generate the least poverty. The wide protection that is the aim of the social-democratic and corporatist strategies may at first sight offer the best recipe for combating poverty, but there is no logically compelling reason for this assumption. It is also conceivable that such comprehensive systems will lead to adverse and unintended economic effects, so that they ultimately produce more poverty (less collective prosperity, destruction of jobs, lower disposable incomes, poverty traps). This is the familiar essence of the neoclassical thesis of the negative impact of the welfare state on the economic process. In fact, the strategy of each regime type can for various reasons lay a theoretical claim to the lowest 'poverty production'.

The actual institutional structure in different countries may offer more clues for hypothesising about the relationship between regime type and poverty than the model strategies. Vrooman (2009: 209-248) performed a categorical principal components analysis (CatPCA) of 54 traits of the formal social security regulations in eleven countries during the early 1990s. He concluded that, based on the actual institutional differences, the three regime types can be interpreted in terms of two dimensions: the scope of social security (residual/ extensive) and the degree of particularism or universalism. The liberal regime type applies to the USA, Australia, Canada and the United Kingdom, and is residual; the corporatist type (as present in Belgium, Germany and France) is extensive and particularistic; and the social-democratic system as manifest in Sweden, Denmark and Norway is extensive and universalistic. The Netherlands emerged as a hybrid type from the analysis, combining corporatist and social-democratic traits.

It may be assumed that the two underlying dimensions of the regimes theoretically reinforce each other in their impact on poverty. A wide scope on the first dimension means among other things relatively high benefits, of longer duration and with relatively little means-testing. On the second dimension, a universalistic regime implies wide coverage, entitlements that are not linked to the employment history, a social assistance scheme which serves as a fully fledged safety net, and many incentives to work, thus fostering the economic independence of all citizens. These factors may all be assumed to reduce the risk of poverty.

The risk of poverty is therefore likely to be lowest in the social-democratic regime type, as the countries in this cluster combine wide scope with a universalistic structure. The Netherlands would be expected to follow at a short distance, because this hybrid regime is slightly less extensive and universalistic. However, the positioning of the representatives of the corporatist and liberal regimes is less clear. The expected poverty risk associated with these regime types depends on the relative weight one assigns to the two dimensions. If they weigh equally heavily, the 'institutionally determined' poverty risk of the corporatist and liberal countries is more or less comparable. The representatives of the corporatist systems are then likely to generate less poverty because of their broader scope, but this is cancelled out by their less universal design. By contrast, if the first dimension weighs more heavily than the second, the poverty risk would in theory be smaller in the corporatist countries than the liberal states⁹. It is therefore not possible to derive an unambiguous theoretical expectation from the scores on the two dimensions concerning the ranking of the 'institutional' poverty risk in all countries studied here.

Another issue is that the relative importance of social security arrangements for the risk of poverty was not made explicit in the CatPCA performed. It is for example logical that differences in retirement pension are more important for the poverty risk generated by the different regime types than the various arrangements for parental leave for employees; the potential target group for retirement pensions is big-

ger, pension benefits are generally utilised for a longer period, and they account for a larger proportion of the total income of the households concerned.

For this reason, an ‘institutional poverty risk index’ (IPRI) was developed which seeks to accommodate these objections. The index is based on around 50 characteristics of social assistance, old age pensions and benefit schemes for the unemployed, disabled, surviving dependants and the costs of children. The underlying data relate to the same eleven countries in the CatPCA mentioned above, but this time for the situation in around the year 2000.

The IPRI is explicitly an *institutional* index: it seeks to give an indication of the theoretical poverty risks that may be expected on the basis of the formal social security institutions, assuming that the other circumstances (national prosperity¹⁰, demographic conditions, and so on) remain the same. The details of the construction of the IPRI are given by Vrooman (2009: 423-426). Figure 2 shows the index scores for the countries studied according to the regime type to which they belong.

Figure 2 Theoretical institutional poverty risk index for eleven countries, by regime type (1999-2001)



Sources: Soede et al. (2004); OECD (2002); EC (2002); SSA (2002); adapted

The index values suggest that the poverty risk based on institutional characteristics is theoretically greatest in the liberal regimes, with an average score of 0.77. There is however some dispersion within this regime type. The institutional poverty risk index is far and away the highest in the USA; the social security arrangements in this country generate the highest poverty risks with respect to pensions, social assistance, disability benefits and family benefits. The USA comes in second place for unemployment benefits, and achieves a lower (and therefore more favourable) score only on survivor’s benefits. In Australia the poverty risk is a bit less, mainly because collective pensions and family benefits are wider in scope than in the US, even though they are means-tested. The United Kingdom has a substantially lower index value. This country scores second for pensions and disability benefits, but this is offset by lower contributions to the poverty risk from social assistance, survivor’s benefits and family benefits. Based on the formal institutions, Canada theoretically generates the lowest poverty risk of the liberal countries. It achieves a fairly reasonable score (from 6th to 9th place) for disability benefit, survivor’s benefits and social assistance, but does worse (second and third places) on unemployment and family benefits. The countries with a corporatist regime occupy a middle position; their average IPRI-score (-0.05) is slightly below the general average (zero). The differentiation within this regime type is low: theoretically the poverty risk in Belgium and Germany is only slightly lower than in France. The latter country

has the best pension provisions of the corporatist group; it attains the 8th place in the ranking. This is due to the fairly high replacement rates for the lower incomes in old age, wage indexation of first pillar pensions and a relatively short build-up period; these are mitigated by the absence of separate collective pension entitlements for people without an employment history. Nonetheless, France ends up higher on the IPRI than the other two corporatist countries because of the higher poverty risk generated by social assistance and survivor's benefits.

Belgium has the poorest pension provision within the corporatist group (the second highest poverty risk of all countries). This is mainly due to the poor provisions for people who never held a job, the limited indexation mechanism (price inflation only), and the long period required to build up a full standard pension (42 years). On the other hand, Belgium compensates for this with fairly good scores on unemployment benefits, social assistance, family benefits and survivor's benefits. In Germany the protection via pensions is moderate, mainly because of the low net replacement rates at minimum level and the lack of collective entitlements for people who never worked. The country also achieves a low score for disability benefit, due to the limited coverage of the *risque social*. This is offset to some extent by reasonable scores for social assistance and by the fact that family benefits in Germany carry the lowest poverty risk of all countries studied.

The poverty risk theoretically generated by the institutional setup is lowest in Denmark (-1.01) and the Netherlands (-0.99). Sweden and Norway score slightly higher on the index, but are still well below the general average. Across all social-democratic countries together the poverty risk score (-0.59) is considerably lower than in the corporatist group. Denmark achieves a low score on all constituent indices (ranging from 8th to 11th place), with the exception of survivor's benefits, for which the country has no separate scheme. Sweden also scores high on the latter aspect; it ends up above Denmark on the total index because of the moderate poverty risk generated by old age pensions, family benefits and social assistance. The theoretical poverty risk for unemployment and disability benefits is by contrast very low in Sweden (10th and 11th place, respectively). Norway offers good protection against poverty via pensions (10th place on the risk index) and also achieves a reasonable score for disability benefits (7th place), but generates a higher poverty risk on the other arrangements (3rd to 5th place).

The low poverty risk generated by the hybrid Dutch regime is due mainly to the low score on old age pensions (11th place), which weigh heaviest in the total index. Compared to Denmark, the Dutch pension schemes offers higher replacement rates, has slightly broader coverage for people without an employment history, and both first and second pillar pensions are indexed by the evolution of wages. Unlike Sweden and Denmark, the Netherlands moreover has an extensive collective survivor's insurance system by international standards. The other schemes also theoretically generate little poverty in the Netherlands (8th to 9th place), with the exception of family benefits (5th place), which are much lower than in the neighbouring corporatist countries.

Based on the average scores on the IPRI, three simple hypotheses on the relationship between regime types and the extent of poverty can now be formulated:

- (1) In countries with a liberal regime, poverty is higher than in countries with a regime of the corporatist type;
- (2) In countries with a corporatist regime, poverty is higher than in countries with a regime of the social-democratic type;
- (3) In countries with a social-democratic regime, poverty is higher than in the hybrid Dutch regime.

In more formal terms, these hypotheses can be expressed as follows:

All other things being equal, $P_{LIB} > P_{CRP} > P_{SD} > P_{HYB}$

where P = degree of poverty
 LIB = representatives of the liberal regime type (US, AU, CA, UK)
 SD = representatives of the social-democratic regime type (SE, DK, NO)
 CRP = representatives of the corporatist regime type (BE, DE, FR)
 HYB = hybrid regime type (NL)

4. Empirical results

The correlation between regime types and poverty has been the subject of several earlier empirical studies. Korpi & Palme (1998), for example, drew up their own classification of four welfare state types, and subsequently analysed how these correlated with a number of distributive indicators. Their ‘encompassing’ type comprises the social-democratic countries (minus Denmark), while the ‘corporatist’ type consists of the continental countries of Western Europe, plus Italy and Japan. Korpi & Palme assign most of the countries that are regarded here as liberal to a ‘basic security’ type, but also include Denmark and the Netherlands in this group. Australia is placed by them in a separate ‘targeted’ category. Although their classification of countries is doubtful in several respects¹¹, Korpi & Palme do find some correlation between their institutional types and a number of indicators for poverty and inequality (the 50% median threshold and the Gini coefficient). Using data from the Luxembourg Income Study in around 1985, they conclude that there is an opposition between systems with generous wage-related benefits for all inhabitants (the encompassing model) with little poverty or inequality, and those countries which offered only basic security or which were highly targeted (high levels of poverty and inequality). The corporatist countries fell between these two groups. Korpi & Palme (1998: 675) therefore concluded that institutional arrangements determine the income distribution and the concentrations at its lower end:

These results give considerable support for our hypothesis about the overall role of welfare state institutions in the distributive processes of the Western countries.

The fit is however by no means perfect. The Netherlands, placed by these authors in the basic security group, has just as little poverty and inequality as the countries with an encompassing system, while the Australian type which they consider to be unique achieves the same levels of poverty and inequality as the USA, Canada and the United Kingdom.

Vogel (2003) also finds indications for a relationship between regime types and the distributive outcomes, based on data from the European Community Household Panel Survey from 1994. He draws attention to the contrasts between the Nordic countries (little poverty or inequality), a Central European cluster (an intermediate position) and a Mediterranean group (high rates of poverty and inequality). Analyses based on later waves of the ECHP, and using different versions of the relative poverty line (the 60%-threshold), lead to comparable conclusions (see e.g. Ras et al., 2002; CPB/SCP, 2003; Eurostat, 2004). Wildeboer Schut et al. (2001) also included a number of non-European countries in their analysis¹² and, like Korpi & Palme, found a dichotomy. In their case, however, the dividing line was not positioned between the ‘encompassing’ countries of Scandinavia and the rest, but between the liberal countries on the one hand (high relative poverty rates with the exception of Canada) and the corporatist and social-democratic regimes on the other (low poverty rates, with the exception of France). Wildeboer Schut et al. concluded that Esping-Andersen’s ‘three worlds of welfare’ can be clearly separated from each other empirically in terms of the institutional arrangements, but that they are not entirely reflected in the distributive results.

The contours of the typology can also be clearly observed in the graph shown in appendix 1, in which the poverty rate according to the 60%-threshold is included for various countries over two decades. Viewed over the whole period, the liberal countries generally attain the highest poverty rates (and income inequality). The social-democratic group and the Netherlands achieve the lowest rates, with the LIS observations for Denmark in the mid-1980s and early 1990s as outliers. Countries with a corporatist regime have lower poverty rates than liberal countries, but on average slightly higher rates than the social-democratic regime types¹³.

These results appear to confirm the hypotheses to some extent. Given this, is further research into the relationship between regime types and poverty necessary at all? The answer to this question is ‘yes’, and for a number of reasons. The most important are the limitations already highlighted of the poverty line used in these studies: the relative poverty threshold at the level of 50% or 60% of median income. This

threshold was considered invalid, and also failed to meet the requirements of reliability and socio-political credibility. The correlations found in the research carried out thus far chiefly reflect the fact that the regimes differ in the degree of inequality they produce. The latter is quite in line with Esping-Andersen's original theory; he posited that the 'three worlds of welfare' differ in the degree of stratification they intend to bring about (Esping-Andersen, 1990: 55-78). In terms of poverty as considered here, however, these outcomes provide little information.

Another point of criticism that can be levelled against many of the earlier international comparative studies is that the relationship between regime type and poverty is often analysed as an isolated bivariate correlation. No allowance is generally made for the influence of other characteristics which can affect national poverty rates, such as the demographic profile. If retired people and young people are generally more often poor, for example, a country with a relatively elderly or very young population will – all other things being equal – produce more poverty than a country with a more balanced demographic composition. Allowing for this requires a multivariate analysis which establishes the effect of regime type on the poverty rate after controlling for the influence of alternative explanatory factors.

A third objection is more technical in nature. In most poverty research, and thus also in comparative studies focusing on the relationship between regime types and poverty, the emphasis tends to be on the headcount ratio or poverty incidence, i.e. the percentage of people living below a given poverty line. This is understandable: it is in principle an easily understood criterion, which leads to an unambiguous ranking of empirical observations. It is however questionable whether it provides an accurate reflection of the true level of poverty. With one and the same poverty rate, the depth of poverty (the average amount by which poor people fall short) and the poverty inequality (the distribution of shortfalls within the poor group) can be very different. These aspects really ought to be taken into account, but in research practice this does not happen very often, even though it is possible to capture them in composite poverty measures (see e.g. the overviews in Zheng, 1997 and Jäntti & Danziger, 2000; and for a practical international comparative application Ras et al., 2002).

All in all, therefore, there is sufficient reason to re-examine the relationship between regime types and poverty. This is done here using data from the Luxembourg Income Study that are available for the group of eleven countries in around the year 2000. The LIS is a harmonised database containing detailed micro-income data from a large number of countries. The equivalised disposable household income of persons in the database has been used to establish whether people fall below the two variants of the poverty line according to the generalised budget approach.¹⁴

The LIS data analysed here ('wave 5') shows a number of improvements compared with earlier editions. The household definition is more consistent across the different countries – in earlier waves, for example, tax units, which could belong to the same household type, were taken as a basis in Sweden – and the quality of the income information has been improved in some countries (among other things by adding income data drawn from administrative sources). One drawback of the LIS data is that they are only available via remote access, which imposes constraints on the statistical analyses that can be performed. Another limitation is that only one measurement point is considered here; detailed time series with annual measurements are not available. Although data are available for several other years on most of the countries discussed here, in some cases comparability over time is not optimum (e.g. due to changes in survey design).

A final limitation is that poverty is established here on the basis of the adequacy of the available annual income. Whilst a year in poverty is by no means a short period, for some groups (e.g. the self-employed) it could perhaps be desirable to consider a longer time span, as their incomes can fluctuate widely from one year to the next. However, empirical analyses of Dutch multiple-year income data have shown that generally there is no clear 'breaking point', whereby the problems associated with poverty rises sharply after a particular period. The financial assets of poor households, and the extent to which they are able to make ends meet, are substantially less after four years than after one year; but in the Netherlands at least this is a fairly gradual process (CBS/SCP, 1999: 24).

4.1 Country-specific norm amounts for a single person

It was concluded earlier that the poverty line developed by The Netherlands Institute for Social Research | SCP is a good operational criterion for covering the theoretical denotation of poverty. The two variants of this criterion will therefore be used here to test the hypotheses. For the country comparative analysis the Dutch amounts from the two variants of the SCP threshold for a single person in 2000 (see table 1) have been converted to local currency using purchasing power parities¹⁵. It would of course be desirable to assess the threshold amounts for the individual countries using the same method as that applied for the Netherlands and taking into account national differences in prices, taxation and consumption patterns. However, the reference budgets and the data that would be needed for this are not available.

Table 2 shows the norm amounts for a single person according to the ‘basic needs’ and ‘modest but adequate’ variants of the poverty threshold. In the empirical analyses all amounts are in national currencies, as derived by the application of purchasing power parities (the first two columns of amounts in the table). To gain an impression of the comparative level of the poverty lines, they have also been converted into euros (based on the official conversion rates for Eurozone countries and exchange rates elsewhere).

In five countries, the deviations from the Dutch norm amounts are found to be limited: Australia comes out 4% lower, France, Canada, Belgium and Germany between 1% and 7% higher. The UK norm amounts for a single person are 15% higher; and Sweden, the United States, Denmark and Norway are the most expensive countries (between 22% and 29% higher than in the Netherlands).

On an annual basis the ‘basic needs’ criterion for a single person ranges from 7,600 to 10,400 euros, while the ‘modest but adequate’ criterion is between 8,600 and 11,800 euros. In most countries, both threshold amounts for a single person are below the relative poverty line (60% of median income) in 2000 as published by the OECD (Förster & Mira d’Ercole, 2005). In Australia, France and Germany, however, the amount for the ‘modest but adequate’ variant is 4-7% above the national relative poverty line.

Table 2 Poverty thresholds for a single person in 11 countries, 2000 (annual amounts)

| | In national currencies ^a | | | In euros ^b | |
|----|-------------------------------------|-------------|---------------------|-----------------------|---------------------|
| | | basic needs | modest but adequate | basic needs | modest but adequate |
| AU | AUD | 12,017 | 13,637 | 7,562 | 8,581 |
| NL | NLG | 17,652 | 20,032 | 8,010 | 9,090 |
| FR | FRF | 53,306 | 60,494 | 8,127 | 9,222 |
| CA | CAD | 11,178 | 12,685 | 8,169 | 9,271 |
| BE | BEF | 334,118 | 379,167 | 8,283 | 9,399 |
| DE | DEM | 16,773 | 19,034 | 8,576 | 9,732 |
| UK | GBP | 5,602 | 6,357 | 9,200 | 10,440 |
| SE | SEK | 82,658 | 93,803 | 9,792 | 11,112 |
| US | USD | 9,227 | 10,471 | 10,015 | 11,365 |
| DK | DKK | 75,187 | 85,324 | 10,096 | 11,457 |
| NO | NOK | 84,066 | 95,401 | 10,367 | 11,764 |

a. SCP poverty thresholds for the Netherlands transformed to national currencies by applying OECD purchasing power parities for actual individual consumption.

b. Poverty thresholds in national currencies recalculated by means of exchange rates 2000 (official conversion rates for euro countries).

The amounts in table 2 apply for disposable income; after compulsory government taxes, social insurance contributions, etc. have been deducted from the received salary, benefits, profits etc., the remainder should be adequate to cover the other unavoidable or highly desirable expenditure items.

4.2 Sensitivity analysis of equivalence scales

The norm amounts for a single person cannot be applied directly to other types of household. A family with four children will find it more difficult to make ends meet from 10,000 euros than a single person:

there are more mouths to feed, more furniture and beds are needed, the energy costs will be higher, expenses will be incurred for school and childcare, insurance is more expensive, and so on. To allow for this, an equivalence scale is often used. This comprises a set of ratios which indicate how much extra income households need in order to derive the same utility or level of welfare as a reference household. The ratios (or equivalence factors) then express, for example, how many 'equivalent single adults' there are in households with a certain composition.

Equivalence scales usually take account in some way of economies of scale. As a result, they generally do not increase directly proportional to the size of the household. A couple with four children will need a larger house than a single person in order to achieve the same level of welfare, and will therefore incur greater housing costs; on the other hand, they do not need to occupy six homes that are suitable for a single person.

Whether or not households are poor can then be determined by examining whether the equivalised income (the nominal income divided by the equivalence factors) lies below the norm amount for the reference household. The same result will of course be obtained if this latter amount is multiplied by the equivalence factors and the resultant household-specific poverty lines are compared with the original nominal incomes.

Naturally, the question that arises here is which equivalence scale is the best to use. This is not a trivial issue, because the equivalence scale chosen can influence the poverty that is detected. For example, the more steeply the equivalence scale rises with the size of the household, the greater the number of large families that are classed as poor (given a constant threshold amount for the reference household). With steeper equivalence scales, the factor by which the nominal income is divided becomes higher, so that more large families end up below the threshold amount. This implies that both the number of poor and the share of large families in the poor group will increase.

As stated, the Dutch version of the generalised budget approach to poverty uses equivalence factors calculated by Statistics Netherlands (CBS) (Siermann et al., 2004). This equivalence scale is fairly well approximated if each adult is counted as 1 and each child as 0.8, and the square root of the sum of all individual weights is then extracted. It then also resembles the scales proposed in the report mentioned earlier by the US National Academy of Sciences. The latter are however steeper: the NAS proposes giving all adults a weight of 1 and each child a weight of 0.7; the sum of all weights is then raised to the power of 0.65 to 0.75 (Citro & Michael, 1995). It can however not be taken for granted that the equivalence scales suggested by Statistics Netherlands or the NAS are suitable for other countries, as empirically the situation may be different there (e.g. less housing costs in more sparsely populated countries, fewer energy costs in milder climates).

By convention three other variants are often used in international comparative research:

- the *(old) OECD equivalence scale*, also known as the 'Oxford scale'. This scale assigns a value of 1 to the first adult household member, 0.7 to each additional adult and 0.5 for each child. The household income is then divided by the sum of the values of the household members in order to obtain equivalent incomes. The OECD (1982) introduced this scale for use in "countries which have not established their own equivalence scale".

- the *modified OECD equivalence scale*, proposed by Hagenaars et al. (1994). This rises less steeply as the number of household members increases. The first adult household member is given a weight of 1; each additional adult counts for 0.5, and each child for 0.3. The European Union uses this scale to determine the level of relative poverty in the member states (see e.g. EC, 2007).

- the *square root equivalence scale*. Here, household income is divided by the square root of the total number of persons in the household. A family of four is thus considered to need twice as much income as a single person in order to achieve the same level of welfare. This equivalence scale (and not the one which bears its name) has often been applied by the OECD in recent years in international comparisons (see e.g. Förster & Mira d'Ercole, 2005).

Their conventional nature is at once the main objection to these equivalence scales. There are no compelling reasons to assume that they adequately reflect the actual welfare differences between various

types of household; and no grounds at all to suppose that the equivalences must be the same in all countries and periods. Furthermore, the conventional scales are based on relatively few household characteristics. They differentiate according to household size and partially to age (the square root scale, however, does not distinguish between adults and children). It is rather plausible that finer age distinctions (e.g. young adults, over-65s), gender, health status and present income level are also important in determining the experienced level of welfare.

To get round this problem, *empirical equivalence scales* are often used, especially in national research into poverty and inequality. At first sight, these are less problematic. The best known are the scales based on consumer demand models (see e.g. Lewbel, 1997). These models use a system of regression equations to estimate how consumptive units (households) with divergent characteristics distribute their total income, given specific prices, across consumer goods and services. Equivalence factors can then be derived from the ratios of the estimated expenditure of different types of households relative to a reference household.

The estimation of equivalence factors based on consumer demand models is intended to provide a 'technical' solution to the arbitrariness of the conventional scales. In practice, however, normative elements still creep in (Cowell & Mercader-Prats, 1999: 410-412; for an overview see Jäntti & Danziger, 2000: 316-322). An equivalence scale can be regarded as the rate of exchange between nominal and equivalised incomes. For households with specific traits it gives the function by which nominal income is transformed in such a way that the welfare or utility level of the reference household is attained. The equivalence scale can thus also be interpreted as a 'cost of characteristics' index:

$$e_h = \frac{C(u_0, p, z_h)}{C(u_0, p, z_0)}$$

where

e_h = equivalence for household with characteristics z_h ;

c = cost/expenditure function;

u_0 = utility level of reference household;

p = vector of prices (assumed constant across households);

z_h = vector of characteristics of household;

z_0 = vector of characteristics of reference household

The formula makes clear that the equivalence factor is determined not *only* by the differences in the characteristics of the household (such as size, composition, age), but also by prices and by the adopted points of reference. The price vector is not necessarily the same for all household types (farmers spend less on food and milk than town-dwellers), even though this is generally assumed to be the case; and if a different reference level of utility is chosen, the ratios on the cost of characteristics index can turn out differently. Equivalence scales based on consumer demand models tend to make normative choices here.

More fundamental is the assumption that the utility levels of households with different characteristics can be compared accurately¹⁶ (see e.g. Pollak & Wales, 1979). This is not however self-evident. Suppose a person has a motor disability, so that they spend more on transport (e.g. a wheelchair, taxis) than a healthy person and less on other items. In principle, the 'pure' additional costs of the disability (controlling for age, household size and composition, etc.) can be established reasonably well using consumer demand models, and from this the conditional equivalence factor relative to the reference household can be derived. However, the extra transport costs for people with a motor disability do not by definition imply that they achieve the same level of welfare as people without disabilities. If someone becomes disabled, their needs may change; transport becomes more important to them, and in order to achieve the same utility as before they may have to spend more than their income allows; or the extra transport costs may force them to economise on other items, which is also tantamount to a loss of welfare.

When determining the level of poverty and income inequality the researcher is interested in unconditional equivalence factors: "index numbers which reflect the ratio of expenditures required to attain a particular indifference curve under alternative demographic profiles" (Pollak & Wales, 1979: 217). Since budget data generally contain no information enabling the estimation of indifference curves, Cowell & Mercader-Prats (1999: 409) conclude that

[...] econometric equivalence scales cannot in general be identified from observed micro-data; in practice, they are identified by making assumptions that are not ethically neutral, and that may be criticized as arbitrary and controversial. [Thus] there can be no one 'correct' equivalence scale.

In empirical comparative research it has been found repeatedly that, while the equivalence scale chosen influences the poverty rate and the composition of the poor population, the ranking of countries and the trends observed are however often comparable (Burniaux et al., 1998; Jäntti & Danziger, 2000). For this reason, a pragmatic approach is followed here. It involves an assessment of the degree to which the measured poverty rate varies if a large number of equivalence scales are applied to the norm amounts for a single person outlined earlier. These equivalence scales are captured by the formula

$$e = (1 + aN + bK)^c$$

where

e = equivalence scale;

N = number of additional adults;

K = number of children below 18 years of age;

a = multiplier for additional adults;

b = multiplier for children;

c = exponent of sum score

The conventional equivalence scales discussed earlier, the equivalence scale developed by Statistics Netherlands (CBS) and the scales proposed by the NAS all are variants of this formula. Comparing the poverty rates and ranking of countries using a range of different scales provides some evidence on the impact of the chosen equivalence scale on the empirical results. Two comments need to be made about this sensitivity analysis, however. First, the number of characteristics on which the equivalence scale is based is again limited in this analysis: household size and a fairly rough division by age of the family members (older/younger than 18 years¹⁷). In addition, the most extreme variants of the equivalence formula probably will not be perceived as reasonable by many people. At one extreme is the *nominal income*, where the welfare differences between same-income households with a different composition are ignored. Here, the poverty line for the reference household serves as the norm for all households, and it is therefore assumed the larger families do not need to spend more in order to achieve the same level of welfare. The variant at the other extreme assumes that welfare differences show a linear increase with the number of family members. This approach in terms of the *per capita income* ignores economies of scale, which for instance implies that the family with four children mentioned above would indeed need six single-person dwellings in which to live. Although the extreme variants have little credibility, therefore, they do provide an indication of the maximum bandwidth in the poverty rate using different equivalence scales.

Table 3 shows results of this sensitivity analysis in the 11 countries in terms of the headcount ratios. In variant 1 (nominal income) the poverty rate lies between 2% and 7%. Variant 18 (per capita income) delivers much higher figures: between 27% and 54% of the population are characterised as poor based on this equivalence scale. Between these two extremes the poverty rate in all countries rises steadily¹⁸ if higher parameter values are chosen, with large jumps in variants 17 and 18. The increase between variant 1 and variant 18 is smallest in Denmark and Norway (approx. +10 percentage points), and greatest in France and Australia (between +40 and +47 percentage points).

The ranking of countries is fairly stable for divergent parameter values¹⁹. Regardless of the equivalence factor used, Australia always comes in first place, with the highest poverty rate. Similarly, Norway and Denmark record the lowest relative number of poor people for each equivalence scale. Belgium, the UK and Canada also occupy fairly stable positions in the poverty ranking. In a few countries this is not the case, however. With higher parameter values, France climbs higher up the ranking of poor countries (comparatively more poverty), while Germany falls (comparatively less poverty). The Netherlands has the fewest poor people for the two least steep variants, and thereafter remains for a long time in third place. With the 'steepest' variants (17 and 18), the poverty rate in the Netherlands rises rather sharply, pushing the country into a middle position. The reverse applies for the USA. In most variants this country has one of the higher poverty rates; for the final two variants, however, the poverty rate rises less

than elsewhere, moving the country to the middle segment. Sweden initially falls down the ladder, but according to the last two to four variants the poverty rate rises comparatively strongly. For most countries, it makes no difference for their position in the ranking whether the basic needs or the modest but adequate variant of the poverty line is used. According to the latter criterion, Belgium and Sweden are one place higher up the ranking than on the basis of the basic needs criterion; applying the higher threshold thus leads to a comparatively large increase in these countries. The USA comes in most cases almost two places lower when the modest but adequate criterion is used; the growth in poverty is comparatively small if the higher threshold amount is used.

Table 3 Sensitivity analysis: poverty rates according to a class of equivalence scales (around 2000)

| Equivalence scale* | | e=(1 + aN + bK) ^c | | | % of population below basic needs poverty criterion | | | | | | | | | | |
|--------------------|--------------------------------------|------------------------------|-------------|------------|--|------------|------------|------------|------------|------------|-------------|------------|-------------|-------------|-------------|
| | | a | b | c | NL | NO | DK | SE | DE | BE | FR | CA | US | UK | AU |
| 1 | Nominal income | 0 | 0 | 0 | 1.9 | 1.4 | 1.7 | 4.2 | 4.0 | 2.8 | 2.5 | 2.7 | 3.7 | 3.6 | 5.5 |
| 2 | - | 0.5 | 0.5 | 0.1 | 1.9 | 1.5 | 1.8 | 4.2 | 4.2 | 2.9 | 2.6 | 2.9 | 4.0 | 3.8 | 5.8 |
| 3 | - | 0.5 | 0.5 | 0.25 | 2.2 | 1.6 | 1.8 | 4.4 | 4.5 | 3.5 | 3.1 | 3.4 | 4.5 | 4.3 | 6.5 |
| 4 | - | 1 | 0.5 | 0.25 | 2.4 | 1.6 | 1.8 | 4.5 | 4.7 | 3.9 | 3.6 | 3.7 | 4.8 | 4.6 | 6.9 |
| 5 | - | 1 | 0.5 | 0.35 | 2.8 | 1.7 | 2.0 | 4.7 | 5.4 | 4.6 | 4.4 | 4.2 | 5.6 | 5.3 | 7.7 |
| 6 | - | 1 | 0.5 | 0.5 | 3.7 | 1.8 | 2.2 | 5.3 | 6.5 | 5.9 | 6.5 | 5.6 | 7.2 | 7.1 | 11.4 |
| 7 | - | 1 | 0.7 | 0.5 | 3.9 | 1.9 | 2.3 | 5.8 | 6.9 | 6.4 | 7.3 | 6.2 | 7.9 | 8.1 | 12.8 |
| 8 | Statistics Netherlands | 1 | 0.8 | 0.5 | 4.3 | 2.0 | 2.3 | 6.0 | 7.1 | 6.7 | 7.9 | 6.5 | 8.2 | 8.8 | 13.5 |
| 9 | Square root scale | 1 | 1 | 0.5 | 4.7 | 2.1 | 2.4 | 6.4 | 7.4 | 7.0 | 8.8 | 7.2 | 8.9 | 10.3 | 15.1 |
| 10 | OECD modified scale | 0.5 | 0.3 | 1 | 5.3 | 2.2 | 2.7 | 7.0 | 7.9 | 8.9 | 11.2 | 8.5 | 10.3 | 11.9 | 17.0 |
| 11 | Alternative scale: (SN+NAS)/2 | 1 | 0.75 | 0.6 | 5.5 | 2.2 | 2.7 | 7.1 | 8.1 | 9.5 | 10.9 | 8.4 | 10.1 | 12.4 | 17.5 |
| 12 | US NAS (low) | 1 | 0.7 | 0.65 | 6.4 | 2.4 | 3.0 | 7.9 | 8.6 | 10.1 | 12.6 | 9.4 | 11.2 | 13.8 | 19.1 |
| 13 | - | 1 | 0.5 | 0.75 | 7.0 | 2.6 | 4.0 | 8.6 | 9.8 | 12.1 | 14.4 | 10.5 | 12.3 | 15.3 | 21.3 |
| 14 | US NAS (high) | 1 | 0.7 | 0.75 | 8.6 | 3.1 | 4.8 | 10.2 | 11.2 | 12.9 | 17.5 | 12.5 | 14.1 | 18.5 | 24.6 |
| 15 | Oxford (old OECD) scale | 0.7 | 0.5 | 1 | 11.2 | 3.9 | 6.0 | 12.0 | 13.2 | 14.6 | 21.1 | 14.8 | 16.1 | 21.4 | 28.1 |
| 16 | - | 1 | 1 | 0.75 | 11.7 | 4.3 | 6.8 | 13.7 | 14.0 | 15.8 | 21.9 | 15.3 | 16.6 | 22.2 | 28.8 |
| 17 | - | 1 | 1 | 0.9 | 24.7 | 9.9 | 13.2 | 25.0 | 22.6 | 24.3 | 33.6 | 23.3 | 23.4 | 30.3 | 39.1 |
| 18 | Per capita income | 1 | 1 | 1 | 33.2 | 17.2 | 20.3 | 33.8 | 30.4 | 32.1 | 41.6 | 30.3 | 28.6 | 36.4 | 46.3 |

| Equivalence scale* | | e=(1 + aN + bK) ^c | | | % of population below modest but adequate poverty criterion | | | | | | | | | | |
|--------------------|--------------------------------------|------------------------------|-------------|------------|--|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | a | b | c | NL | NO | DK | SE | DE | BE | FR | CA | US | UK | AU |
| 1 | Nominal income | 0 | 0 | 0 | 2.4 | 3.0 | 3.2 | 6.7 | 5.6 | 4.8 | 3.8 | 3.8 | 4.8 | 5.1 | 6.9 |
| 2 | - | 0.5 | 0.5 | 0.1 | 2.6 | 3.1 | 3.2 | 6.8 | 5.9 | 5.0 | 4.2 | 4.2 | 5.2 | 5.4 | 7.3 |
| 3 | - | 0.5 | 0.5 | 0.25 | 3.2 | 3.1 | 3.3 | 7.0 | 6.4 | 5.8 | 5.1 | 4.8 | 5.9 | 6.2 | 8.3 |
| 4 | - | 1 | 0.5 | 0.25 | 3.3 | 3.2 | 3.4 | 7.3 | 6.8 | 6.3 | 5.7 | 5.2 | 6.3 | 6.8 | 9.5 |
| 5 | - | 1 | 0.5 | 0.35 | 4.0 | 3.3 | 3.6 | 7.7 | 7.7 | 8.0 | 7.1 | 6.1 | 7.4 | 8.1 | 12.1 |
| 6 | - | 1 | 0.5 | 0.5 | 5.3 | 3.6 | 4.3 | 9.1 | 9.1 | 10.3 | 10.5 | 8.1 | 9.7 | 11.7 | 17.1 |
| 7 | - | 1 | 0.7 | 0.5 | 6.0 | 3.8 | 4.5 | 9.7 | 9.5 | 10.9 | 11.9 | 9.1 | 10.6 | 13.7 | 18.9 |
| 8 | Statistics Netherlands | 1 | 0.8 | 0.5 | 6.4 | 3.9 | 4.6 | 10.1 | 9.8 | 11.3 | 12.6 | 9.5 | 11.1 | 14.7 | 19.5 |
| 9 | Square root scale | 1 | 1 | 0.5 | 7.3 | 4.1 | 4.8 | 10.9 | 10.2 | 12.3 | 13.8 | 10.5 | 12.0 | 16.3 | 20.4 |
| 10 | OECD modified scale | 0.5 | 0.3 | 1 | 8.5 | 4.3 | 5.9 | 11.9 | 11.6 | 14.2 | 17.0 | 12.2 | 13.9 | 18.3 | 24.1 |
| 11 | Alternative scale: (SN+NAS)/2 | 1 | 0.75 | 0.6 | 8.6 | 4.5 | 6.0 | 12.2 | 11.6 | 13.9 | 16.8 | 12.2 | 13.7 | 18.7 | 23.9 |
| 12 | US NAS (low) | 1 | 0.7 | 0.65 | 9.6 | 4.8 | 6.9 | 13.2 | 12.9 | 14.8 | 19.1 | 13.5 | 14.8 | 20.4 | 26.0 |
| 13 | - | 1 | 0.5 | 0.75 | 11.5 | 5.3 | 8.1 | 14.7 | 14.8 | 17.1 | 21.9 | 15.3 | 16.0 | 22.2 | 28.3 |
| 14 | US NAS (high) | 1 | 0.7 | 0.75 | 13.8 | 6.2 | 9.7 | 17.4 | 17.1 | 19.5 | 25.4 | 17.6 | 18.2 | 25.3 | 31.7 |
| 15 | Oxford (old OECD) scale | 0.7 | 0.5 | 1 | 17.9 | 7.8 | 11.6 | 21.1 | 20.1 | 22.3 | 29.9 | 20.4 | 20.8 | 28.0 | 35.5 |
| 16 | - | 1 | 1 | 0.75 | 19.5 | 8.7 | 12.6 | 23.4 | 20.8 | 22.5 | 31.1 | 21.1 | 21.4 | 29.0 | 36.6 |
| 17 | - | 1 | 1 | 0.9 | 33.8 | 18.4 | 21.9 | 36.8 | 31.9 | 33.4 | 43.3 | 31.1 | 29.1 | 37.9 | 47.1 |
| 18 | Per capita income | 1 | 1 | 1 | 43.7 | 26.9 | 30.8 | 45.7 | 39.8 | 43.9 | 51.3 | 38.4 | 34.5 | 44.1 | 54.1 |

* In formula with
e = equivalence scale
N = number of additional adults
K = number of children below 18 years of age
a = multiplier for additional adults
b = multiplier for children
c = exponent of sum score

Source: Luxembourg Income Study (1999-2001)

If only the familiar equivalence scales are considered, the picture is even more stable. If the headcount ratios are compared according to the two variants which are furthest apart from each other in the table ('Statistics Netherlands' and 'Oxford'), the changes in the rankings are very limited. If the basic needs poverty line is taken as a basis, there are seven countries in exactly the same place in variants 8 and 15. The other four move up or down the ranking by at most two positions. Based on the modest but adequate criterion, five countries share an identical position according to both the 'Statistics Netherlands' and 'Oxford' scales; with the other seven, the difference is no more than one position.

What then constitutes a reasonable equivalence scale? If the conventional methods are examined more closely, the objection may be levelled at the square root scale that it does not distinguish between adults and children. If a married couple has the same household income as a single-parent with a newborn child, they are therefore assumed to attain the same level of welfare. The OECD-modified scale does draw a crude distinction by age. Here, however, one may question the linear increase in the equivalence scale: each additional adult or child carries the same weight as the previous one; there are no economies of scale. The same applies for the Oxford scale, which seems moreover fairly steep, resulting in rather high poverty rates (8-36%) for prosperous countries.

The strength of the equivalence scales put forward by Statistics Netherlands and the US National Academy of Sciences is that they distinguish between adults and children and allow for economies of scale. Compared with the two conventional scales most commonly used in international comparative research (square root and OECD-modified), however, the Dutch scale is fairly flat (leading to low poverty rates), while the two American variants are actually steeper than usual (resulting in fairly high poverty rates).

For practical reasons, it was therefore decided to base the further analysis on a hybrid form: an equivalence scale which follows a middle path between the Statistics Netherlands equivalence scale and the average of the two scales propagated by the NAS. In the chosen equivalence scale (variant 11), each adult carries a weight of 1, each child 0.75, and with a rising number of household members the equivalence factor exhibits a slightly stronger non-linear increase than with the square root scale ($c=0.60$). In table 1 the norm amounts for this alternative equivalence scale in the Netherlands were already presented for a number of household types.

Given the earlier discussion of the merits of different equivalence scales, this is inevitably a normative choice. It does however seem reasonable in view of the highlighted limitations of the existing conventional scales and the somewhat extreme nature of the Dutch and American approaches. The poverty rates produced by the adopted equivalence scale are virtually the same as those based on the OECD-modified scale, with a maximum deviation of +0.6 percentage points (UK, basic needs variant). The difference compared with the square root scale is greater, rising to +3.5 percentage points for Australia using the modest but adequate criterion.

Applying this equivalence scale, the correlation between the poverty rates and income inequality is much smaller than when the 60% of median income criterion is taken as the poverty threshold (cf. appendix 1). For the 11 countries studied here in around the year 2000, the correlation between the Gini coefficient and the relative poverty is 0.95, i.e. almost perfect. The basic needs and modest but adequate criteria also correlate with this inequality measure, but less strongly (0.70 and 0.65, respectively).

4.3 The 'three I's of poverty' and the regime types

It was noted earlier that much international comparative research focuses exclusively on the poverty rate, ignoring two other potentially important aspects of poverty, namely the income deficits of the poor and the distribution of those deficits among the poor. These aspects are sometimes described as the 'three I's of poverty': the *incidence*, *income deficit* and *inequality* of poverty (see e.g. Jenkins & Lambert, 1997). The incidence (also referred to as the poverty rate or headcount ratio) is an intuitively clear indicator: the proportion of the population with an income below the poverty line is an obvious key indicator both for policymakers and in the public debate. If the poverty line amount is regarded as a funda-

mental right, it also has legal significance: the incidence of poverty then indicates how many people's basic entitlements are being infringed. Yet the indicator also has some drawbacks. It implies that households are either poor or not poor, and this simple dichotomy may not fully reflect the actual situation as experienced by people. Is someone really not poor any more if he has an income that is one euro below the poverty line and receives an additional two euros? And does his condition improve just as much as in the case of someone who has a deficit of 1000 euros and receives an additional 1001 euros? Moreover, there is a possible objection from a policy perspective: based on this indicator measures aimed at those just below the poverty line will be found to be the most efficient, as these reduce the poverty rate at the lowest cost.

There is thus some justification for looking at the income deficit as well. Based on this indicator, there is also a reduction in poverty if the incidence remains constant but the average or median deficit of the poor reduces. The depth of poverty thus helps determine the judgment as to the severity of the problem: if 5% of the population are below the poverty line, it is less serious if they fall short by an average of 10 euros per year than if their income deficit is 1000 euros. The income deficit provides an indication of the difficulty and costs that will be involved in lifting this group out of poverty, and is therefore also relevant from a policy perspective. One comment that needs to be made here is that the indicator becomes less relevant if the poverty line is set at a very spartan level or allows little scope for discretionary expenditure. In that case, poor people cannot keep their heads above water anyway, and just like drowning people who cannot swim, it makes no difference how far below the water surface they are – they will still drown.

As regards the third aspect, the income inequality within the poor population, the assumption is that there is more poverty if the dispersion of the deficits is greater. Income redistribution among the poor will therefore also alter the structure of poverty: if money is transferred from a 'wealthy' poor person (just below the poverty line) to a poorer person (a long way below the threshold) poverty will reduce, even if the incidence and median income deficit do not change. From a policy perspective, the inequality criterion quickly leads to the conclusion that it is efficient to redistribute income in order to decrease the deficit of the poorest. This can be justified if one supposes that the marginal utility of income decreases. For the very poorest people, the extra amount can mean that they will not die of hunger, while for the 'wealthier' poor person the lost income may mean that they can no longer pay their telephone bill. The former could be allowed to weigh more heavily than the latter. At first sight this is a defensible standpoint, but here again another line of reasoning can be followed. To use the analogy of the drowning person once more: if a few people are swimming slightly below the water surface, they may have a chance of escaping; that may be preferable to a situation where all swim at greater depth but drown.

Since these are all relevant aspects of income poverty, however, it is still useful – despite the objections that can be levelled at each – to analyse all three indicators here, and to explore to what extent empirical results are in line with theoretical expectations. Table 4 shows the poverty rates, the median percentage income deficits and the inequality of the deficits (measured using the Gini coefficient) for both variants of the poverty line, applying the equivalence scale selected earlier.

Three composite measures are also reported; these summarise the differences on several of these aspects simultaneously. The intensity index is simply the product of the incidence and the median income deficit. The Sen index and the Shorrocks index also take the inequality among the poor into account. If a few familiar axioms are accepted, the Shorrocks measure is the most attractive from a theoretical point of view.²⁰

With both poverty lines, the differences between the countries are greatest with regard to the incidence. In the country with the most poor people, the incidence with the basic needs poverty criterion is eight times as high as in the country with the fewest poor; based on the modest but adequate poverty threshold, the figure is five times as high.

The spread in the income deficits is less marked (the maximum is roughly twice as high as the minimum), and the inequality among the poor varies even less (a ratio of between 1.2 and 1.4). This implies that for the composite measures the differences will be mainly due to the divergent poverty rates, and

to a lesser extent to the median income deficits and the inequality in them. It may thus be expected that the three indices will lead to roughly the same conclusions as the incidence.

Table 4 Poverty indicators according to basic needs and modest but adequate criteria^a

| | Basic needs poverty criterion | | | | | | Modest but adequate poverty criterion | | | | | |
|----------------------------|-------------------------------|---------------------------|-------------------------------|-----------------|-----------|-----------------|---------------------------------------|---------------------------|-------------------------------|-----------------|-----------|-----------------|
| | Incidence (% poor) | Income deficit (median %) | Inequality of deficits (Gini) | Intensity index | Sen index | Shorrocks index | Incidence (% poor) | Income deficit (median %) | Inequality of deficits (Gini) | Intensity index | Sen index | Shorrocks index |
| NL | 5.5 | 25.2 | 0.256 | 1.4 | 2.5 | 2.8 | 8.6 | 19.0 | 0.238 | 1.6 | 3.3 | 3.3 |
| SE | 7.1 | 15.6 | 0.256 | 1.1 | 2.6 | 2.2 | 12.2 | 15.2 | 0.246 | 1.9 | 4.4 | 3.8 |
| DK | 2.7 | 13.1 | 0.231 | 0.4 | 0.9 | 0.7 | 6.0 | 10.5 | 0.223 | 0.6 | 1.8 | 1.3 |
| NO | 2.2 | 24.6 | 0.285 | 0.6 | 1.0 | 1.1 | 4.5 | 12.4 | 0.252 | 0.6 | 1.5 | 1.1 |
| DE | 8.1 | 20.7 | 0.234 | 1.7 | 3.2 | 3.3 | 11.6 | 21.4 | 0.241 | 2.5 | 4.7 | 4.9 |
| BE | 9.5 | 14.6 | 0.224 | 1.4 | 3.2 | 2.8 | 13.9 | 16.5 | 0.213 | 2.3 | 4.8 | 4.6 |
| FR | 10.9 | 16.3 | 0.216 | 1.8 | 3.8 | 3.6 | 16.8 | 17.9 | 0.213 | 3.0 | 5.9 | 6.0 |
| UK | 12.4 | 14.3 | 0.227 | 1.8 | 4.5 | 4.5 | 18.7 | 17.6 | 0.219 | 3.3 | 6.7 | 6.6 |
| CA | 8.4 | 21.8 | 0.239 | 1.8 | 3.1 | 3.0 | 12.2 | 21.1 | 0.240 | 2.6 | 4.9 | 5.1 |
| AU | 17.5 | 15.2 | 0.204 | 2.7 | 6.5 | 7.2 | 23.9 | 20.9 | 0.211 | 5.0 | 9.0 | 9.7 |
| US | 10.1 | 24.2 | 0.263 | 2.5 | 4.2 | 4.2 | 13.7 | 25.1 | 0.263 | 3.4 | 6.1 | 6.7 |
| Regime type average | | | | | | | | | | | | |
| Hybrid (NL)=ref. | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Social-democratic | 0.72 | 0.71 | 1.00 | 0.48 | 0.62 | 0.49 | 0.88 | 0.67 | 1.01 | 0.62 | 0.79 | 0.63 |
| Corporatist | 1.72 | 0.68 | 0.88 | 1.16 | 1.38 | 1.17 | 1.64 | 0.98 | 0.94 | 1.59 | 1.56 | 1.59 |
| Liberal | 2.19 | 0.88 | 0.91 | 1.56 | 1.88 | 1.71 | 1.99 | 1.12 | 0.98 | 2.19 | 2.02 | 2.16 |

a. Assessed against equalised disposable household income of persons, around 2000

Source: Luxembourg Income Study (1999-2001)

Basic needs criterion

According to the basic needs poverty criterion, the incidence is lowest in Norway and Denmark (2-3%). The Netherlands follows at some distance (just over 5% poverty) and Sweden comes in fourth place (7%). The three corporatist countries all score higher (8-11%), as do the four liberal countries (8-17%). Hypothesis 1 ($P_{LIB} > P_{CRP}$) is thus supported by the data: the poverty rate is higher on average in the liberal group than in the corporatist cluster (+2.6 percentage points). This is however attributable largely to the high incidence of poverty in Australia; if this country is left out of consideration, the differences are less obvious, with only the United Kingdom scoring distinctly higher than the corporatist countries.

The picture is even clearer when it comes to hypothesis 2 ($P_{CRP} > P_{SD}$). All corporatist countries have higher poverty rates than the social-democratic countries, and as a result the averages in these regime types diverge in the expected direction (+5.5 percentage points).

Hypothesis 3 ($P_{SD} > P_{HYB}$) is however not supported as regards the incidence of poverty. Norway and Denmark have significantly fewer poor people than the hybrid Netherlands; only Sweden scores somewhat higher. The average poverty rate in the three social-democratic countries is lower than in the Netherlands, contrary to expectations (-1.5 percentage point). The hybrid regime type does however score below the average rates in the corporatist and liberal regime types.

Linking the income deficits to the regime types is a less straightforward matter. The deficits are greatest in the Netherlands, Norway and the USA (a median value of around 25%), followed by Germany and Canada (approx. 20%) and the other countries (approx. 15%). Due to the scores of the USA and Canada, the liberal countries on average have a higher median income deficit than the corporatist group. This is in line with hypothesis 1, but the difference is not great. The social-democratic countries come out roughly on a par with the corporatist group, so that hypothesis 2 is not supported. The score of the Netherlands is actually completely opposite to the theoretical assumption in hypothesis 3: the country does not have the smallest median income deficit among the poor, but the largest.

The differences between countries in terms of inequality of deficits also run contrary to expectations. The limited differences reveal a divide between the social-democratic countries plus the Netherlands on the one hand (slightly higher Gini coefficient of income deficits than elsewhere, with the exception of Denmark) and the corporatist and liberal countries on the other (lower Gini coefficients, except in the USA).

The three indices show the same pattern as the poverty incidence, but the differences are less marked because they are dampened by the less clear rankings on the other two *I*'s. Denmark and Norway have the lowest scores on the composite measures, with the high income deficit of the Norwegian poor putting this country into second place. Sweden and the Netherlands come next; the hybrid regime ends up somewhat lower in the rankings due to the high median income deficit. The Netherlands is below all the social-democratic countries on the intensity index and the Shorrocks index. On the Sen index, the Netherlands comes in roughly the same place as Sweden, even though the poverty rate is substantially lower.

The corporatist countries still form a homogenous middle group, and the liberal countries have the highest scores. Australia is again that the poorest country according to the three indices. Its distance from the other countries however, is less than in the case of the incidence because of the low median income deficit and dispersion. The United States climbs up the rankings somewhat: the poverty rate is not exceptionally high, but the income deficit and inequality are.

Based on these composite measures, the conclusion for the degree of poverty of the regime types is the same as for the incidence. Hypothesis 1 is sustained, with the difference between the liberal and corporatist group now being due not only to the high score of Australia, but also to that of the USA. In line with hypothesis 2, the corporatist countries score higher than the social-democratic cluster across the board on the composite measures. Once again, however, hypothesis 3 has to be rejected: the Netherlands does not attain lower, but higher scores than the social-democratic group on the composite poverty measures.

Modest but adequate criterion

Applying the more generous modest but adequate criterion leads to similar conclusions. The ranking for incidence is virtually identical, being lowest in Norway and Denmark (5-6%), followed by the Netherlands (9%). Germany overtakes Sweden in the rankings on this measure, but the difference is small: when rounded off, both countries score 12%. Canada has the same poverty rate as Sweden; Belgium and the USA score slightly higher (just under 14%). As with the lower threshold amount, the incidence of poverty is highest in France (16%), the United Kingdom (17%) and Australia (24%).

The differences are somewhat larger when it comes to income deficits. These are no longer highest in Norway and the Netherlands, but in the United States. Australia undergoes a relatively sharp increase on this indicator. The country differences in the inequality of deficits are even smaller than with the basic needs criterion. On the three composite measures, Norway now scores lowest across the board, while the Netherlands consistently comes below Sweden. Australia again records by far the highest score on the three indices.

Hypothesis 1 receives most support with the three composite measures, with three of the four liberal countries (with Canada as the exception) coming consistently higher than Germany, Belgium and France. The average incidence in the liberal group is also higher than in the corporatist regime types (+3.0 percentage points), but as with the basic needs criterion this is due mainly to the high scores of Australia and the United Kingdom. The income deficits and the inequality in them reveal no systematic difference between the liberal and corporatist regime types.

Hypothesis 2 also receives the most support based on the indices, with all social-democratic countries coming below all corporatist countries (though on the Sen index the difference between Sweden on the one hand and Germany and Belgium on the other is not very large). When it comes to the incidence, the differences between the groups are mostly in line with expectations as well (except for the positions of Sweden and Germany). On average the between cluster difference equals 6.5 percentage points. The

median income deficits in the social-democratic countries are somewhat smaller than in the corporatist group, as expected; but this does not apply for the inequality of the deficits.

Hypothesis 3 is not supported on the basis of the incidence and the three composite measures: the Netherlands comes substantially higher than Norway and Denmark in all cases. On average, the incidence in the social-democratic group is 1 percentage point less than in the hybrid regime. The median income deficit in the Netherlands also runs contrary to expectations, being greater than in the three social-democratic countries. The differences in inequality of deficits are negligible.

In sum, regardless of the level of the poverty line chosen, support is found for hypotheses 1 and 2 based on the incidence and the three indices, and also partially on the grounds of income deficits. By contrast, hypothesis 3 is not supported by any indicator. It is however questionable whether this straightforward, bivariate comparison of the poverty indicators is empirically sound; the countries studied here may differ from each other in more respects than the regime type. In order to obtain a clearer picture of the impact of the regime types on poverty, a model-based approach is required.

4.4 Explaining the poverty incidence: multi-level models

The regime types are theoretically not the only determinants of the differences in poverty; other macro-characteristics, such as differences in national prosperity, can have an influence as well. It is also possible that variables at lower scale levels explain part of the differences in the national poverty figures: characteristics of individuals and households at micro-level, labour relations and administrative processes at meso-level, and so on. Multi-level analysis is the most appropriate technique for establishing the influence of such hierarchically ordered causal factors (see e.g. Snijders & Bosker, 1999). This technique starts from the premise that the spread in the dependent variable stems from a number of nested sources: pupils in schools in neighbourhoods, employees in companies in countries, patients in hospitals in regions, and so on. The total variance in the dependent variable is decomposed across the different levels. At each level it is then possible to assess to what extent independent characteristics (age of the patient, size of the hospital, population density of the region, etc.) are able to predict the specific part of the variance.

In order to determine the pure influence of the regime types, a number of multi-level models were developed. In each case, being poor or not being poor (the incidence) is the dependent variable. The income deficits of the poor and the inequality therein are left out of consideration here. In many countries the number of observations for multi-level analyses with these variables as dependent is too small, due to the fact that the non-poor are by definition ignored with these criteria²¹. Moreover, as stated the between country variance is much more limited as regards the income deficits and the inequality than for the incidence of poverty.

When dealing with a dichotomous dependent variable (such as poor/not poor), multi-level logistical regression is the most appropriate technique to use. If an ordinary regression analysis were to be performed on such a variable, the probabilities predicted by the model may become smaller than 0 or greater than 1. In the logistical approach this is avoided by taking the logarithm of the odds ratios (in this case: the probability that someone is poor, divided by the probability that they are not) as a starting point. A predicted value of zero in such a model indicates that the independent variable has no effect. In that case the probability that someone is poor is the same as the probability that they are not ($p=0.50$); the odds ratio is therefore equal to 1, and its logarithm is 0. In logistic regression models, a negative coefficient implies a low probability of the dependent trait to occur; a positive coefficient points to an increased risk (e.g., -4.6 corresponds with an estimated probability of being poor of 0.01, while +4.6 equals a probability of 0.99).

For technical reasons, only two levels are distinguished in the models: persons in countries. This is because the LIS data could only be analysed via remote access using standard software, and the available version of the Stata software package did not allow more than two levels of analysis²². Two problems arose here: the program is not good at dealing with weighted data, and a correction had to be applied for the fact that some people were members of the same household. This was resolved by drawing physical subsamples of equal size (approx. 1,225 persons in each country, making a total of over 13,000

observations), in proportion to the household weight and minimising the number of persons originating from the same household²³.

At level 1 (persons), the models incorporate five explanatory characteristics. One of these is a pure person variable, namely age. Dummy variables were used here for three age categories, with 30-59 year-olds as the reference group. The other variables were household characteristics that are attributed to the person: number of earners, number of children, (not) living in a single-parent family, and (not) belonging to a poorly educated household. The latter is the case where the head and – if present – partner have completed an education no higher than level 2 of the UNESCO International Standard Classification of Education (ISCED 97), i.e. no higher than lower secondary education or initial vocational training²⁴.

The number of explanatory characteristics at level 2 had to be restricted because the number of countries is fairly small. National prosperity was measured on the basis of GDP per capita (which in this analysis is not regarded as an endogenous characteristic of the regime types²⁵). A number of variants for the regime classification were tested in separate models: the country scores on the two dimensions (scope and universalism) which emerged from Vrooman's (2009: 209-248) categorical principal component analysis discussed earlier, the scores on the institutional poverty risk index (IPRI), and dummy variables for the three regime types and the hybrid Dutch system. From a theoretical point of view, it would be expected that the scores on the IPRI would provide the best explanation for the poverty incidences. The dummy variables make it possible to test the hypotheses in a formal way, but would be expected to have less explanatory power than the IPRI.

Table 5 presents the outcomes of seven multi-level logistical regression models for the risk of poverty based on the modest but adequate criterion²⁶. In the *unconditional hierarchical model* (model 1) no explanatory factors are incorporated; this 'empty' model serves as a reference point. It can be deduced from this that most of the unexplained variance²⁷ in the dependent variable is at the lowest level, that of the persons; only 7.5% of the variance is related to country level.

In *model 2* the person variables discussed earlier (level 1) and per capita GDP (level 2) are added. The proportion of explained variance is 0.38. Most of this is attributable to person variables²⁸; but at level 2 the proportion of unexplained variance (0.029) is much lower than in the empty model. All coefficients are statistically significant, with the exception of the effect of gender (and the constant).

At level 2 the expected relationship is found: the more prosperous a country is, the lower the risk of poverty. At person level the effects also operate in the expected direction. The poverty risk rises as the number of earners reduces, the number of children increases, and if people belong to single-parent families or households whose head and partner (where present) have a low education level. Measured by age, the poverty incidence relative to 30-59 year-olds is high among children younger than 18 and young people aged 18-30 years. The latter group excludes students living outside the home; the effect thus mainly reflects the lower earnings of working young people and their higher risk of unemployment, often coupled with low benefits. The over-60s are poor significantly less often than 30-59 year-olds, mainly because of the correction for the number of earners, which is smaller on average in this group. After controlling for the effect of the characteristics cited, the influence of gender is negligible. Based on the z-values (not shown in table), the number of earners is the most important variable at level 1. The number of children, a low-educated household and the 18-30 years age group roughly exert the same influence on poverty and rank second. The pure effects of single-parent families and 0-17 year-olds are the least important, though unlike the effects of the gender variable they are statistically significant.

In models 3-7 a number of variants of the regime typology were then introduced at the second level. Since the group of countries studied here does not exhibit very strong correlations between national wealth and regime type, these additions to the model do not lead to multicollinearity problems. The explained variance is higher in all cases than in the model incorporating only per capita GDP. The other indicators also suggest a better fit: the log likelihood is lower and the Wald χ^2 higher than in model 2, and the differences compared with that model are statistically significant²⁹ in all cases.

In *model 3* the country scores on the two separate regime dimensions reported by Vrooman (2009) – scope and universalism – are added as explanatory characteristics at the second level. The proportion of unexplained variance at level 2 now falls to 0.010. Only the first dimension is found to have a statistically significant effect: a more extensive social security system reduces the risk of poverty, even after controlling for the level of wealth. The degree of universality (the second dimension) has no influence, however: this effect is negligible and not statistically significant.

Table 5 Multi-level logistic regression models^a

| Model ^b | 1 unconditional hierarchical model | 2 level 1 + gdp/cap | 3 level 1 + gdp/cap + regime dimensions | 4 level 1 + gdp/cap + institutional poverty risk index | 5 level 1 + gdp/cap + regime type (ref.=LIB) | 6 level 1 + gdp/cap + regime type (ref.=SD) | 7 level 1 - gdp/cap + regime type (ref.=SD) |
|---|---------------------------------------|---------------------------|--|---|---|--|--|
| Level 2 variables | | | | | | | |
| GDP per capita (* 1000 US \$) | | -0.05 | -0.04 | -0.05 | -0.04 | -0.04 | |
| Scope (regime dimension 1) | | | -0.31 | | | | |
| Universalism (regime dimension 2) | | | <i>0.01</i> | | | | |
| Institutional poverty risk index | | | | 0.52 | | | |
| Hybrid regime type ^c | | | | | -1.02 | <i>-0.40</i> | <i>-0.14</i> |
| Social-democratic regime type ^c | | | | | -0.63 | <i>ref.= 0.00</i> | <i>ref.= 0.00</i> |
| Corporatist regime type ^c | | | | | -0.54 | <i>0.09</i> | <i>0.48</i> |
| Liberal regime type ^c | | | | | <i>ref.= 0.00</i> | <i>0.63</i> | <i>0.89</i> |
| Level 1 variables | | | | | | | |
| Age < 18 years ^c | | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 |
| Age 18-30 years ^c | | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 |
| Age 30-59 years | | <i>ref.= 0.00</i> | <i>ref.= 0.00</i> | <i>ref.= 0.00</i> | <i>ref.= 0.00</i> | <i>ref.= 0.00</i> | <i>ref.= 0.00</i> |
| Age > 60 years ^c | | -0.59 | -0.58 | -0.59 | -0.59 | -0.59 | -0.59 |
| Number of earners | | -1.57 | -1.57 | -1.57 | -1.57 | -1.57 | -1.57 |
| Number of children | | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 |
| Single parent | | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.27 |
| Gender | | <i>0.03</i> | <i>0.03</i> | <i>0.03</i> | <i>0.03</i> | <i>0.03</i> | <i>0.03</i> |
| Low level of education | | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| Constant | -2.00 | <i>0.69</i> | <i>0.55</i> | 0.75 | 0.97 | <i>0.34</i> | -1.01 |
| Fit indicators | | | | | | | |
| Prop. explained variance (level 1+2) | 0.000 | 0.384 | 0.401 | 0.408 | 0.401 | 0.401 | 0.395 |
| Prop. unexplained variance (level 1) | 0.925 | 0.587 | 0.588 | 0.587 | 0.591 | 0.591 | 0.592 |
| Prop. unexplained variance (level 2) | 0.075 | 0.029 | 0.010 | 0.005 | 0.008 | 0.008 | 0.014 |
| Residual intraclass correlation (rho) | 0.075 | 0.047 | 0.018 | 0.009 | 0.014 | 0.014 | 0.023 |
| Log Likelihood | -5038.4 | -3994.5 | -3989.5 | -3986.5 | -3988.4 | -3988.4 | -3990.7 |
| Δ -2 Log Likelihood (Δ df); ref.=model 2 | . | . | 10.0 (2) | 16.0 (1) | 12.2 (3) | 12.2 (3) | . |
| Probability | . | . | 0.01 | 0.00 | 0.01 | 0.01 | . |
| Wald χ^2 | . | 1431.9 | 1450.4 | 1468.7 | 1457.3 | 1457.3 | 1448.7 |
| Probability | . | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Δ Wald χ^2 (Δ df); ref.=model 2 | . | . | 18.5 (2) | 36.9 (1) | 25.4 (3) | 25.4 (3) | . |
| Probability | . | . | 0.00 | 0.00 | 0.00 | 0.00 | . |
| number of persons (level 1 observations) | 13483 | 13483 | 13483 | 13483 | 13483 | 13483 | 13483 |
| number of countries (level 2 observations) | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| number of persons in countries (range) | 1224-1232 | 1224-1232 | 1224-1232 | 1224-1232 | 1224-1232 | 1224-1232 | 1224-1232 |

a. Dependent variable: non-poor/poor according to modest but adequate poverty line.

b. Changes in comparison with previous model are printed in bold.

c. Dummy variable.

Coefficients printed in italics are not significant at $p < .05$

Source: Luxembourg Income Study (1999-2001)

In *model 4* the scores on the institutional poverty risk index are included as a determinant instead. Here again, the effect operates in the expected direction: the higher the IPRI score, the greater the extent of poverty. However, the fit is better than in the previous model, as borne out by the lower proportion of unexplained variance at level 2 (0.005), the lower log likelihood and the higher Wald χ^2 . As expected, therefore, the institutional poverty risk index explains the empirical differences in poverty incidence in the countries somewhat better than the scope and degree of universalism of the regime.

Models 5 and 6 contain separate dummy variables for the regime types at level 2, with the liberal and social-democratic type, respectively, as reference group. This enables the hypotheses formulated earlier to be tested in a targeted way. As expected, these models fare slightly less well with the empirical data than model 4. The proportion of unexplained variance at the second level is 0.008, and the log likelihood and Wald χ^2 are between those of model 3 and 4. The model with the institutional poverty risk index thus has the greatest explanatory power, as predicted. What is however striking is that the fit of the models with dummy variables is slightly better than the model with the dimensions of the original regime typology. These dimensions thus do not have exceptional explanatory power; earlier it was argued that they are also theoretically less suitable for testing the relationship between regime type and poverty.

Based on *model 5*, hypothesis 1 cannot be rejected. As expected, after correction for per capita GDP, the poverty incidence in the corporatist regime type is significantly lower than in the liberal countries. Remarkably enough, the difference between the two country groups is greater after correction for national wealth than before. This can be deduced from the coefficients in *model 7*, in which per capita GDP is omitted. Here, the low poverty rates in Canada and the USA push down the average poverty rate in the liberal cluster, while the higher poverty rate in Australia pushes it up. The outcomes in model 5 suggest that this is partially due to differences in prosperity. In around 2000, the North American countries were richer than the corporatist countries, while Australia was poorer; and if this is taken into account, the average gap in poverty rates between the two regime types widens somewhat.

Model 5 also shows that poverty in the social-democratic cluster is lower than in the corporatist group, and that the hybrid Dutch regime type scores lowest. This ranking is in line with expectations, but it emerges from *model 6* that the differences vis-à-vis the social-democratic group are not statistically significant. For hypothesis 2, it is interesting to compare the outcomes with those of model 7, which does not contain per capita GDP. In that case the poverty incidence in the corporatist countries is significantly higher than in the social-democratic group, and hypothesis 2 can thus not be rejected. In model 6, however, the hypothesis received no support: after correction for differences in national wealth, the difference still operates in the expected direction, but is no longer statistically significant. Substantively, the multi-level analysis leads to the conclusion that the corporatist group does indeed have a higher poverty incidence than the social-democratic regime type, as expected, but that this is to some extent due to differences in prosperity. In Norway, in particular, but also in Denmark, per capita GDP was significantly higher than in Germany, France and Belgium. Although the pure difference between these regime types operates in the expected direction, it is modest and insignificant in statistical terms. It is also useful to compare the outcomes of model 6 and model 7 with regard to hypothesis 3. If no allowance is made for variations in national wealth (model 7), the Netherlands has a slightly lower poverty rate than the social-democratic group of countries, but the effect is not significant. However, it turns out that this difference is mitigated because per capita GDP in the Netherlands is lower than the average of the social-democratic group. Correcting for this (model 6) produces a greater gap between the hybrid regime and the social-democratic cluster, though yet again this is not statistically significant.

Taking the analyses as a whole, it is apparent that there is little variance in the incidence of poverty at the level of the countries. The combination of regime characteristics and per capita GDP does however explain a large part of the limited level 2 variance (models 3-6) and leads to a better fit than the models in which the two macro-variables are incorporated separately (2 and 7).

Substantively, only hypothesis 1 is not rejected in these analyses: the liberal regime generates more poverty than the corporatist (and substantially more than the social-democratic and hybrid regimes). Hypotheses 2 and 3 receive insufficient support in the multi-level analyses and must therefore be rejected. The differences operate in the expected direction, but the pure regime effects are not statistically significant. It should be noted here that on the theoretical institutional poverty risk index the differences between the liberal and corporatist countries are greatest as well (there is a gap of 0.82 between the average scores on the index). The distances between the social-democratic and corporatist countries, and between the social-democratic cluster and the hybrid Dutch regime, are smaller on the index (respectively 0.54 and 0.40). The fact that it is precisely hypotheses 2 and 3 that have to be rejected is therefore somewhat understandable: the theoretical differences between the regime types are smaller according to the IPRI than in hypothesis 1, and this may explain why the differences in the poverty incidence are not large enough (after controlling for the divergent levels of national wealth) to be statistically significant.

5. Conclusions

This paper explored whether institutional regimes differ in the degree of poverty they bring about. Because the standard poverty lines applied in empirical research, such as the relative income threshold, often are deficient in terms of validity, reliability, ease of application or socio-political relevance, an alternative poverty line was introduced, originally developed for the Netherlands. Based on the detailed budget inventories published by the Dutch National Institute for Budgetary Information, two reference budgets for a single person were first constructed. The 'basic needs' level incorporates costs that are virtually unavoidable for food, clothing, housing (e.g. rent, insurance, energy, water, telephone, furnishings, home maintenance and local taxes) and a few other expenditure items (such as transport, extra medical expenses, personal care and washing agents). This resulted in a sparse but complete budget which in principle makes it possible to run a household independently. The second reference budget, the 'modest but adequate' variant, allows scope for a few expenditure items which go beyond what is strictly unavoidable (recreation, memberships and subscriptions, a pet), but without any luxury (such as a car or foreign holiday).

The reference budgets were then generalised using equivalence factors to create two variants of the initial poverty line for the Netherlands. Following the recommendations of the US National Academy of Sciences, the threshold amounts over time have been determined by indexing the initial norms to the three-year moving average in median expenditure on the basic items food, drink (excluding alcohol), clothing and housing. This leads to an increase in the threshold amounts which exceeds price inflation, but lags behind the growth in national wealth and median income.

Like the expert budget method, this threshold reflects the absolute nature of poverty, and establishes a clear link with what is necessary at a given time and place. The threshold amounts refer to people's consumption possibilities, not to their actual consumption; and the limits have a meaningful interpretation, they are not 'fetishistic'. As a result, the threshold provides valid coverage of the theoretical meaning of poverty. This poverty line is probably also relevant for policymakers and citizens, since the two variants fit in well with the subjective perceptions of poverty among the population. In contrast to traditional expert budget methods, the new threshold is not especially labour-intensive, which means it lends itself well for use in practical research.

For the Netherlands, this approach led to a plausible and readily interpretable trend in poverty rates in the period 1985-2005. The threshold amounts in around 2000 were converted into similar norms for ten other countries using purchasing power parities. Based on a sensitivity analysis, a slightly different equivalence scale was chosen for the comparative norms than in the original Dutch poverty line. The ranking of the countries in terms of poverty rates proved to be fairly stable when applying a variety of equivalence scales.

Postulated relationships between regime types and poverty

This translation of the Dutch threshold amounts to the other countries made it possible to test a number of hypotheses concerning the relationship between institutional regime types and poverty according to the generalised budget approach. The hypotheses were constructed on the basis of the country scores on a theoretical institutional poverty risk index (IPRI); this index indicates to what extent the social security institutions of different countries are conducive to the risk of poverty, all other circumstances (wealth, demographic composition, etc.) being equal.

The expectations were that

- (1) In countries with a liberal regime (Australia, Canada, UK and USA), poverty is higher than in countries with a regime of the corporatist type (Belgium, France and Germany);
- (2) In countries with a corporatist regime, poverty is higher than in countries with a regime of the social-democratic type (Denmark, Norway and Sweden);
- (3) In countries with a social-democratic regime, poverty is higher than in the hybrid Dutch regime.

Empirical results

Based on adapted data from the Luxembourg Income Study, a bivariate analysis was first performed on the 'three I's of poverty': the incidence, income deficit and inequality of poverty. The scores on a number of composite measures (intensity index, Sen index, Shorrocks index), in which all three aspects of poverty are expressed, were also calculated. Hypotheses 1 and 2 received support on the basis of the poverty incidence and the indices, and to some extent were also sustained on the grounds of the income deficits. Hypothesis 3, by contrast, received no support in any of the bivariate analyses.

A multi-level logistical regression analysis was then performed, with the poverty incidence on the basis of the 'modest but adequate' criterion as the dependent variable. This enabled the pure effects of the regime types to be determined whilst controlling for other characteristics in which the countries differ, and also to test whether the differences between the regime types were statistically significant. It emerged from this that only a small proportion of the variance in the poverty incidence is related to differences at the country level (7.5%); the rest consists of differences between individual persons. The limited variance at the country level could however be largely explained by the model variables, whereby the differences between the countries in the scores on the institutional poverty risk index and national wealth (measured by per capita GDP) both made an independent contribution. After correcting for the impact of differences in national prosperity, the effects of the regime types on the poverty rate all operated in the theoretically postulated direction. The difference between the liberal and corporatist groups was found to be statistically significant, so that hypothesis 1 cannot be rejected. Hypotheses 2 and 3 received insufficient support in this analysis, however; although the differences found were in line with expectations, the pure regime effects were statistically too weak.

Thus, it appears that divergent sets of coherent formal institutions in similar circumstances generate different outcomes. The abstract classification of countries in terms of regime types has the postulated impact on the 'production of poverty'; however, the effects are modest and sometimes negligible in statistical terms.

Methodological implications

From a methodological point of view, the 'generalised budget approach' adopted in this paper appears to be a suitable alternative to the standard poverty lines applied in empirical research, such as the relative income thresholds and expert budget standards. Here it was found that this approach not only leads to plausible outcomes in the historical series of Dutch poverty rates, but also in country comparisons. In order to be widely applicable in international comparative research, the instrument would however need some further refinement. For example, it would seem sensible to investigate whether the 'basic needs' and the 'modest but adequate' living standard of the reference household (a single person) is accurately approximated in different countries if the norm amounts for the Netherlands are translated directly using purchasing power parities. This demands a detailed and consistent analysis of the expenditure that would be unavoidable or highly desirable for meeting the minimum level in each country, using the same detailed method as that applied by the Dutch National Institute for Budgetary Information, and taking into account national differences in consumption patterns, prices, and taxa-

tion. It would also be necessary to ascertain whether the equivalence scale selected here is adequate for all countries. Finally, it is important to investigate whether the 'Dutch' mechanism used to index the level of the poverty thresholds over time is suitable for use elsewhere and (given the differing structure of the various national Household Budget Surveys) can be applied consistently in time series analyses across countries. These aspects fell outside the scope of this study, but certainly warrant further research.

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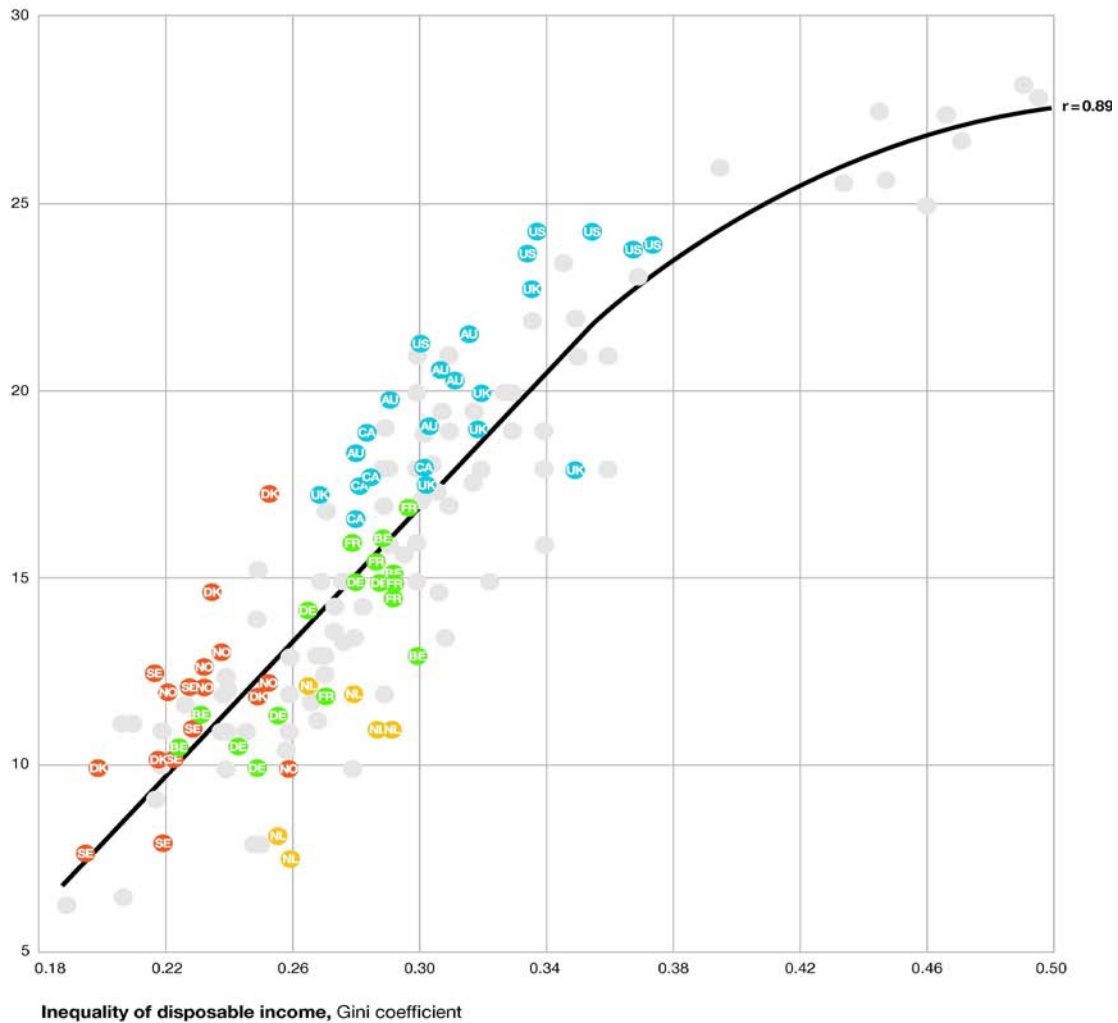
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Appendix 1

Relative poverty and income inequality in 38 countries, 1980-2003^a

Poverty rate, % of persons with equivalised disposable income < 60% median



- Regression line
- Liberal: AU, CA, UK, US
- Corporatist: BE, DE, FR
- Social-democratic: DK, NO, SE
- Hybrid: NL
- Other countries: Austria (4 years included), Bulgaria (2), Croatia (1), Cyprus (2), Czech Republic (4), Estonia (2), Finland (5), Greece (3), Hungary (4), Ireland (4), Israel (5), Italy (4), Latvia (1), Lithuania (1), Luxembourg (5), Malta (1), Mexico (5), Poland (5), Portugal (2), Romania (3), Russia (3), Slovakia (4), Slovenia (2), Spain (5), Switzerland (4), Taiwan (5), Turkey (1)

a. 5-year intervals: circa 1980, 1985, 1990, 1995, 2000, 2002/2003

Sources: Eurostat; Luxembourg Income Study

Notes

¹ Van Praag & Ferrer-i-Carbonell (2004: 295) illustrate this point by assuming that disposable income is distributed in a lognormal way. This is the case when the logarithms of the incomes are normally distributed. The original incomes do not then have the characteristic 'bell shape' of the normal distribution, but are skewed: a relatively large group of people with lower incomes, and a long tail with decreasing frequencies as income rises. Based on this rather common assumption, they show that the poverty rate depends exclusively on the standard deviation, which can be regarded as a measure for income inequality. In practice, incomes are not distributed in a precisely lognormal way; for example, there may be more peaks in the lower segment due to the various social assistance norms for different types of households. Often, however, the lognormal distribution provides a good approximation of the actual income distribution; for the Netherlands, see e.g. Pommer et al. (2003: 51). Neal & Rosen (2000) discuss the theoretical principles underlying the "characteristic skew of earnings distributions", and point out that "observed income distributions tend to have tails that are thicker and longer than the lognormal", and that the Pareto distribution often fits better for the higher incomes.

² If average income is taken as a reference point instead of median income, this focus problem is greater. In that case the poverty line also moves upwards when the incomes of rich people rise in real terms while those at the lower end of the income distribution remain constant. Jänni & Danziger (2000: 327) rightly observe that "it does not seem reasonable to let an increase in Queen Elizabeth's income raise the poverty line and our assessment of the extent of poverty in the UK".

³ In Ireland, GDP per capita rose by 61% between 1987 and 1997, while inflation during that period stood at 29%. Households at the lower end of the income distribution benefited rather less from economic growth than the higher income groups. The consequence was that relative poverty based on the 60%-norm *increased* - from 29% to 36% -, despite the substantial income gains for the bottom groups (cf. Layte et al., 2000). In addition, there is a phasing problem with the relative income threshold. It is not necessarily the case that as soon as the median income rises, the poverty line should increase proportionally (and it is probably even less obvious that the poverty line should fall immediately when median income declines).

⁴ A possible alternative is to base the threshold on 60% of the median income across all EU member states. While this has the obvious advantage that poverty rates are measured by the same yardstick in all countries, it does not solve some of the other problems. Such a relative EU-wide poverty line is also 'fetishistic', because no link is made to the living standard people can actually attain with 60% of the median EU income. In the richest countries the threshold amount is likely to be low, thus leading to low poverty rates; but it may be that the amount is not sufficient to pay all the indispensable costs for a considerable part of the population. By contrast, in the less prosperous member states 60% of median EU income may imply a level which the middle classes find hard to attain, hence a very high poverty rate; but such a threshold could be well above the level that is actually needed for unavoidable expenses in these countries. A further complication is that the poverty rate in each member state becomes dependent on prosperity growth elsewhere. If the income distribution remains constant in all countries, but Germany experiences a sharper increase in median income than the other EU member states, poverty rates in the latter will rise (this is exacerbated by Germany's large share in the total EU population). And if Turkey were to join the EU, the median income across member states would decline, leading to decreasing poverty rates.

⁵ Booth (1902 [1889]) divided the population of London into eight groups based on the level and the regularity of their income, their labour market position, their living circumstances and their behaviour. He regarded the lowest four classes (according to his estimate 31% of the population) as poor, by which he meant that people were living "under a struggle to obtain the necessities of life and make both ends meet" or "in a state of chronic want" (Booth, 1902 [1889]: 33-62). Seebohm Rowntree (1901: 86-118) defined a line for 'primary poverty' based on the necessary outlays for food, housing, clothing, lighting, fuel and other "minimum necessities for the maintenance of merely physical efficiency". His threshold for 'secondary poverty' referred to people who in principle had sufficient income to realise the physical efficiency that was desirable for the factory workers of York, "were it not that some portion of it was absorbed by other expenditure, either useful or wasteful". Using this method - and based on one of the first ever large-scale empirical surveys (more than 11,000 households) - Seebohm Rowntree estimated that 28% of the population of York were poor, and that roughly a third of these people were living below the primary poverty line. He stressed that this criterion referred to a very frugal way of life, with no scope whatsoever for discretionary expenditure: "And let us clearly understand what 'merely physical efficiency' means. A family living upon the scale allowed for in this estimate must never spend a penny on railway fare or omnibus. They must never go into the country unless they walk. They must never purchase a halfpenny newspaper or spend a penny to buy a ticket for a popular concert. They must write no letters to absent children, for they cannot afford to pay the postage. They must never contribute anything to their church or chapel, or give any help to a neighbour which costs them money. They cannot save, nor can they join sick club or Trade Union, because they cannot pay the necessary subscriptions. The children must have no pocket money for dolls, marbles or sweets. The father must smoke no tobacco, and must drink no beer. The mother must never buy any pretty clothes for herself or for her children, the character of the family wardrobe as for the family diet being governed by the regulation, 'Nothing must be bought but that which is absolutely necessary for the maintenance of physical health, and what is bought must be of the plainest and most economical description'. Should a child fall ill, it must be attended by the parish doctor; should it die, it must be buried by the parish. Finally, the wage-earner must never be absent from his work for a single day. If any of these conditions are broken, the extra expenditure involved is met, *and can only be met*, by limiting the diet; or, in other words, by sacrificing physical efficiency" (Seebohm Rowntree, 1901: 133-134).

⁶ The prescriptive method discussed here needs to be distinguished from the descriptive method. The latter merely aims to describe the actual patterns of expenditure of different household types, of which many national statistics offices regularly publish summaries (based on household expenditure survey data). In the prescriptive method, empirical differences in expenditure patterns are taken into account, but it is ultimately the researcher who determines the budget standard. This normative character was one of the reasons for the American Bureau of Labor Statistics to stop compiling prescriptive budgets at the end of the 1980s, bringing to an end a time series that began in 1908/1909 (Johnson et al., 2001).

⁷ Soede (2006: 65-71) provides similar reference budgets for couples with and without children. He also discusses a number of more extensive budgets, which for example incorporate a more generous clothing allowance and the costs of smoking.

⁸ A welfare regime theoretically consists of qualitatively different, coherent systems of formal institutions, covering social security, the labour market, justice, housing, education, etc. Esping-Andersen's original typology, however, mainly refers to social security schemes, as interrelated with the structuring of the labour market. Vrooman (2009: 232-234) points out that the trichotomy clearly emerges in this field, and to some degree in the education system, but hardly in health systems and housing policy. This is in line with Arts & Gelissen's (2002: 153) conclusion that "if one looks at other social programmes than the ones applied by Esping-Andersen, it becomes clear that they do not conform so easily – if at all – to his welfare regime patterns". Vrooman (2009) therefore proposes to use the more restricted term 'social security regime' in order to refer to the phenomena considered in Esping-Andersen's analysis.

⁹ Obviously, the universalism/particularism dimension can also be given more weight than the scope, and in that case the institutionally determined poverty risk would theoretically be greater in the corporatist countries than the liberal group. This would for instance be plausible if among the representatives of this regime type, large groups were not covered by social insurance and had no access to social assistance. The fact that the levels for those who are covered (the 'insiders') are generous would then not be enough to prevent large-scale poverty.

¹⁰ A standard argument of neoclassical economics is that redistribution via the social security system tends to reduce the level of prosperity. If this line of reasoning is taken further, one could posit that per capita GDP should be seen as an endogenous trait of the various regime types. From that point of view, the extensive social-democratic and corporatist regimes ultimately must combine flat income distributions with limited national wealth (and therefore low household incomes): small differences, but high levels of poverty. Similarly, the liberal regimes inevitably bring about larger income differentials and greater collective prosperity; and the latter will translate into low rates of poverty. However, the influence of social security arrangements on the prosperity of a community is not theoretically fixed. Other factors (such as natural resources, the infrastructure, the education level of the population, developments in the world economy) can have a bigger impact on a country's level of wealth than the institutional setup. Whether an extensive welfare state holds back or promotes prosperity is an empirical matter. Furthermore, it should be noted that the collective prosperity in the countries studied here does not correlate in a straightforward manner with the regime type – at least not in the direction that would be expected on the grounds of the neoclassical theory. In 2000, per capita GDP in the six countries with an extensive social-democratic or corporatist regime was 5% higher on average than in the four representatives of the liberal regime. The latter group includes both the USA, the second wealthiest of all the countries studied here (Norway has a higher per capita GDP) and Australia, the country with the lowest collective prosperity.

¹¹ Korpi & Palme's (1998) classification of regime types is contestable, because it is not based on an analysis of the actual interrelation of institutional characteristics. This applies in particular for the separate targeted type: the institutional characteristics of Australia are not so unique that the country could not have been included in the liberal cluster; and if one wished to identify a separate 'Antipodean' cluster, New Zealand would probably also have to be included in it, but according to Korpi & Palme this country belongs to the basic security group. Placing Denmark and the Netherlands in the same cluster as the USA is also striking. While it is true that the social security systems of these two countries have some universalistic elements, the level of social protection they offer is so much higher than the residual American system that it is difficult to justify placing them in the same group.

¹² De Beer et al.'s (2001) LIS-paper provides a summary of this study.

¹³ However, the graph in appendix 1 also shows a number of corporatist observations with 'social-democratic' poverty rates, though no clear line or pattern can be discerned: Belgium in 1985 and 1998, Germany in 1981, 1989 and 2000, and France in 2002.

¹⁴ The analyses have been performed on the data of LIS wave 5, release 1. Poverty figures are based on the equivalised net disposable income as standardly calculated in the LIS project. The construction of this and a description of the underlying variables can be found at <http://www.lisproject.org/techdoc.htm>. The monetary value of some near cash benefits, such as food stamps, housing benefits and education benefits are taken into account. Non-cash benefits such as free school meals or medical care are however generally not included in net disposable income in LIS.

In the variable used, the very high incomes have been removed in accordance with the standard LIS routine for topcoding. At the bottom end, a lower limit of EUR 2,000 of the equivalised net disposable income was applied. This eliminates negative and zero incomes, in particular.

In all countries, persons in households consisting of students living outside the parental home were left out of consideration. This group often has a high risk of poverty, but this is generally attributable to unobserved income components (student grants and loans, parental contributions, provisions in kind, such as student housing). Moreover, students generally have favourable future prospects, so their poverty tends to be temporary in nature. In the unweighted data sets, the proportion of persons living in such student households varied between 0.1% (Belgium) and 2.1% (Sweden).

Specific adjustments were made for two countries. In the Netherlands, households with incomplete sets of questionnaires were left out of consideration, as recommended by LIS. The original data set of Australia does not include children aged younger than 15 years; normally these are taken into account via the weighting factor. Since the multivariate analyses performed here require physical records, for each Australian child a synthetic case has been compiled, based on information on the household composition. To this end, the record of the head of household was copied as many times as the number of children aged younger than 15. The position in the household was converted for these cases from head to child. Their age was taken as 8 years, the class average of the 0-14 year-olds. Gender was randomly assigned to the individual synthetic children, based on the proportion of 51.1% boys and 48.9% girls. The education level was set at 'in education', the labour market position at 'not in labour force'. The other person variables were set at missing for the Australian children.

Detailed information on the LIS project and of the national data sets used is available at <http://www.lisproject.org>.

¹⁵ The Dutch norms for 2000 were converted for the other countries using the OECD purchasing power parities for actual individual consumption. In three countries, however, the data used did not relate to the year 2000. In the United Kingdom (1999) and Australia (2001) the norm amounts for 2000 were corrected by applying the index of expenditure on basic budget items according to the National Accounts. For the Netherlands (1999) the amounts given by Soede (2006) and Soede & Vrooman (2008) were used.

¹⁶ There are also a number of other problems with the econometrically determined equivalence factors:

- only equivalent incomes are considered; the welfare impact of time that is not spent on acquiring a market income is left out of consideration (leisure, care and household production);
- it is not self-evident that all members of multiple-person households will experience the same welfare or utility from a given equivalised income;
- only the equivalences in a given year are considered, whereas it may be more logical to look at spending patterns over a longer period and in relation to the phase of life.

¹⁷ Note that all persons younger than 18 years who are not the head of the household or a partner are regarded as children in these analyses, and the appropriate equivalence factor is accordingly applied. This differs from the practice followed by Eurostat, for example, with the 'modified OECD scale', where the age limit for children is set at 14 years. From the perspective of parental responsibility and the attainment of full legal capacity, this appears to be on the young side.

¹⁸ The steady increase in the poverty rates deviates from the outcomes generally obtained when a sensitivity analysis such as this is performed on the basis of a relative income threshold (e.g. 60% of the median). The pattern is then often non-linear, with the highest poverty rates at the two extreme parameter values chosen. Coulter et al. (1992) discuss three effects which underlie this. The first effect is that the poverty rate rises as the parameter values increase: because the threshold amounts for non-single households are higher, more observations fall below that threshold. In addition, the form of the income distribution below the poverty line changes with higher parameter values: the poverty deficits and the dispersion of those deficits tend to increase (effect 2). Thirdly, higher parameter values imply that the median equivalised income falls, and the poverty line therefore also moves downwards. The latter works in the opposite direction to the first two effects, and explains the non-linear pattern often seen in a sensitivity analysis of equivalence scales with relative income thresholds: "A U-shaped curve ... will occur if the third effect outweighs the first two at some values of θ but not others" (Coulter et al., 1992: 1076). With the poverty line adopted here, the third effect does not occur: the threshold amount of the reference household does not change if the parameter values of the equivalence scale are increased. Theoretically, therefore, it would be expected that the headcount ratio gradually increases. If a composite poverty measure is used which is also sensitive to the deficits and the dispersion of those deficits, the increase will be even greater.

¹⁹ A similar sensitivity analysis was performed for the median income deficits of poor households. This often is slightly non-linear: the low equivalence scales generate fairly high deficits, but at first these become smaller if higher parameters are chosen. From a certain point median deficits start to rise, and fairly sharply for variants 17 and 18.

Of all the countries studied, the variation in the median deficits when different equivalence scales are used is greatest in the Netherlands. This is probably due to the specific composition of the poor population, which in the Netherlands contains comparatively few single elderly persons. The number of households in which the income changes as a result of the standardisation is higher (compare the second effect of Coulter et al. (1992) discussed earlier). As a consequence, the position of the Netherlands in the ranking of median deficits is not stable. With the basic needs criterion, the Netherlands occupies first place (highest median deficit) according to the equivalence scale compiled by Statistics Netherlands, but fifth position according to the Oxford scale. Based on the modest but adequate variant, the Netherlands occupies second and eighth position, respectively. The positions of the other countries are more stable if these different equivalence scales are applied, with the exception of France according to the basic needs criterion (a drop of six places).

²⁰ Sen (1976) and Jäntti & Danziger (2000) state that composite measures of poverty should preferably meet the following theoretical requirements:

- (1) they should depend on poor incomes alone (*focus axiom*: if the income of non-poor persons changes, this should not affect the degree of poverty)
- (2) they should be sensitive to the average income among the poor (*monotonicity axiom*: if poor people become less poor, or pass the poverty line, the degree of poverty should decrease)
- (3) they should be sensitive to the distribution of income (*transfer axiom*: a transfer of a poor to a less poor person increases the degree of poverty)
- (4) they should not be affected by a reordering of persons or households (*symmetry*)
- (5) they should not be affected by an identical proportional increase in the number of units with each income level (*replication invariance*).

The composite measures calculated here are defined as:

$$\begin{aligned} \text{Intensity index:} & H \cdot I \\ \text{Sen index:} & H \cdot ((1 + (1 - I)) \cdot G \cdot (q/q + 1)) \\ \text{Shorrocks index:} & H \cdot (I(2 - H) + H(1 - I) \cdot G) \end{aligned}$$

where

- H = headcount ratio (= incidence, poverty rate)
- I = median income deficit of poor persons (as % of poverty threshold)
- G = Gini coefficient of income deficits
- q = number of observations

The intensity index only complies with axioms 1-3, the Sen index with 1-4. The Shorrocks index meets all five conditions. Zheng (1997) discusses a wider array of axioms and aggregate poverty measures.

²¹ In the subsamples used here (cf. below), there are between 55 and 292 poor people per country, a total of more than 1,700 observations. If a balanced design (the same number of observations in each country, as in the analysis of the poverty incidences) were used in such models, this figure would fall further, to just over 600 observations across 11 countries. A multi-level analysis of the country scores on the composite indices is hampered by the fact that the contributions of the individual cases to this macro-figure are unknown.

²² In version 10 of Stata, more hierarchical levels can be analysed, but this version was not available when the calculations were carried out on the LIS computer system. If it had been, there would still have been a weighting problem. In principle, multi-level weights are preferable in such an analysis (see e.g. Pfeffermann et al., 1998; Grilli & Pratesi, 2004). However, the sampling probabilities are not known in the LIS for all

three levels (persons in households in countries); and the available software needed to calculate these weights could only handle two hierarchical levels (cf. Chantala et al., 2006).

²³ These 'physically weighted' subsamples were drawn as follows in each country:

- all persons were first sorted on a random variable, implying households and their members were placed in an arbitrary order;
- a stratified random sample was drawn from this, in proportion to the decile categories of the original weighting factor in the poor and non-poor groups. The number of sampled cases in each stratum was 4-5 times greater than was ultimately needed;
- these sampled cases were then sorted by country, poor/not poor and household number;
- in order to minimise the number of cases from one and the same household, a systematic random sample was then drawn, in which a case was selected from the sorted file every 4-5 persons. This meant that multiple persons from the same household could only be selected in case of very large households.

The physically weighted subsamples replicated the poverty rates from the larger original weighted samples to an accuracy of between 0 and 0.2 percentage points. There were only 1% of households from which more than one household member was selected. If a multi-level analysis is performed with the household number as the second level (disregarding the country differences), the standard errors at the first level hardly increased and the conclusions remain the same. Skipping the household level from the multi-level analysis therefore has virtually no influence on the estimated results in this set of samples, because the number of respondents who are clustered in some way is now very small. In addition, the shares of the various categories of the independent variables (age, education, sex, etc.) in the physically weighted subsamples do not deviate substantially from the original distributions. This is generally also the case with the poverty incidences for each of these categories, although there are some larger deviations at country level (for example, the poverty risk for families with lots of children is five percentage points lower in the physically weighted sub sample in Canada than in the original sample). This often has to do with the small numbers in the physically weighted subsamples, so that a difference of just a few poor observations in the constituent groups can weigh fairly heavily at the country level.

²⁴ For three countries it was not possible to reproduce the ISCED classification accurately in the LIS data, and proxy variables were used instead. In the United Kingdom it was assumed that those who had left full-time education at age 15 or lower had achieved ISCED-levels 1 and 2. For Canada the group up to and including the level '11-13 years elementary and secondary school (but not graduated)' was selected. Australia was the most problematic. The only selection that could be made here was the group with no 'higher/bachelor degree' or 'other post-school qualifications'. This category with no additional qualifications probably also contains a number of people at ISCED-3 level. Set against the official data (OECD, 2006: 37), the proportion of low-educated people appears on the high side in the Danish LIS data set in particular. This also applies to a lesser extent for the United Kingdom and Australia, two countries with a proxy variable. In the Netherlands, by contrast, the proportion of low-educated people in the LIS data set is somewhat lower than according to the official figures.

²⁵ The empirical correlation between GDP per capita and regime type is in fact limited within the group of countries studied here; see note 10 to this paper.

²⁶ The analysis was also performed with poverty according to the basic needs criterion as the dependent variable, using different physically weighted subsamples (because the poor/non-poor groups are not the same). This did lead to very similar conclusions. However, at level 1 the effect of the single-parent family is no longer significant. At level 2 the effects of all regime variables are fractionally weaker, but generally remain equally significant. The only exception to this is the effect of the dummy variable for the corporatist regime type in model 7, which is now only significant at $p < .10$ (formerly at $p < .05$).

²⁷ In a multi-level logistical regression model no estimate is obtained of the explained variance, as is the case in a normal regression analysis. Here, the method proposed by Snijders & Bosker (1999: 225-229) was followed, an extension of the R^2 criterion put forward by McKelvey & Zavoina (1975). The underlying idea is that with a dichotomous classification, an explained proportion variance can be calculated if it is assumed that the contrast (here: poor/not poor) is the result of exceeding threshold values in an underlying continuous process. The explained variance across the two levels is equal to the variance of the linear predictor. In a logistical model, the level-1 variance is by definition equal to $\pi^2/3$, or 3.29 (in a probit model the level-1 variance is equal to 1). The level-2 variance is estimated in the model.

²⁸ In an extra model, in which only the level-1 determinants were incorporated, the proportion of unexplained variance was 0.36. Compared with the empty model 1 in table 5, the unexplained variance at level 1 logically falls. However, the unexplained variance at level 2 also reduces, from 7.5% to 4.0%. This is due to the correction for compositional differences between the countries in terms of the level-1 variables. The introduction of per capita GDP in model 2 leads to an additional reduction compared with the extra model in the unexplained variance at level 2 (from 4.0% to 2.9%). The improvement in the fit ($\Delta -2 \text{ Log Likelihood}$, $\Delta \text{Wald } \chi^2$) in model 2 compared with the model with only level-1 variables is statistically significant at $p < 0.10$.

²⁹ The likelihood ratio test can be used in a multi-level logistical model if the computer program is based on numerical integration, as here; see Snijders & Bosker (1999: 220).